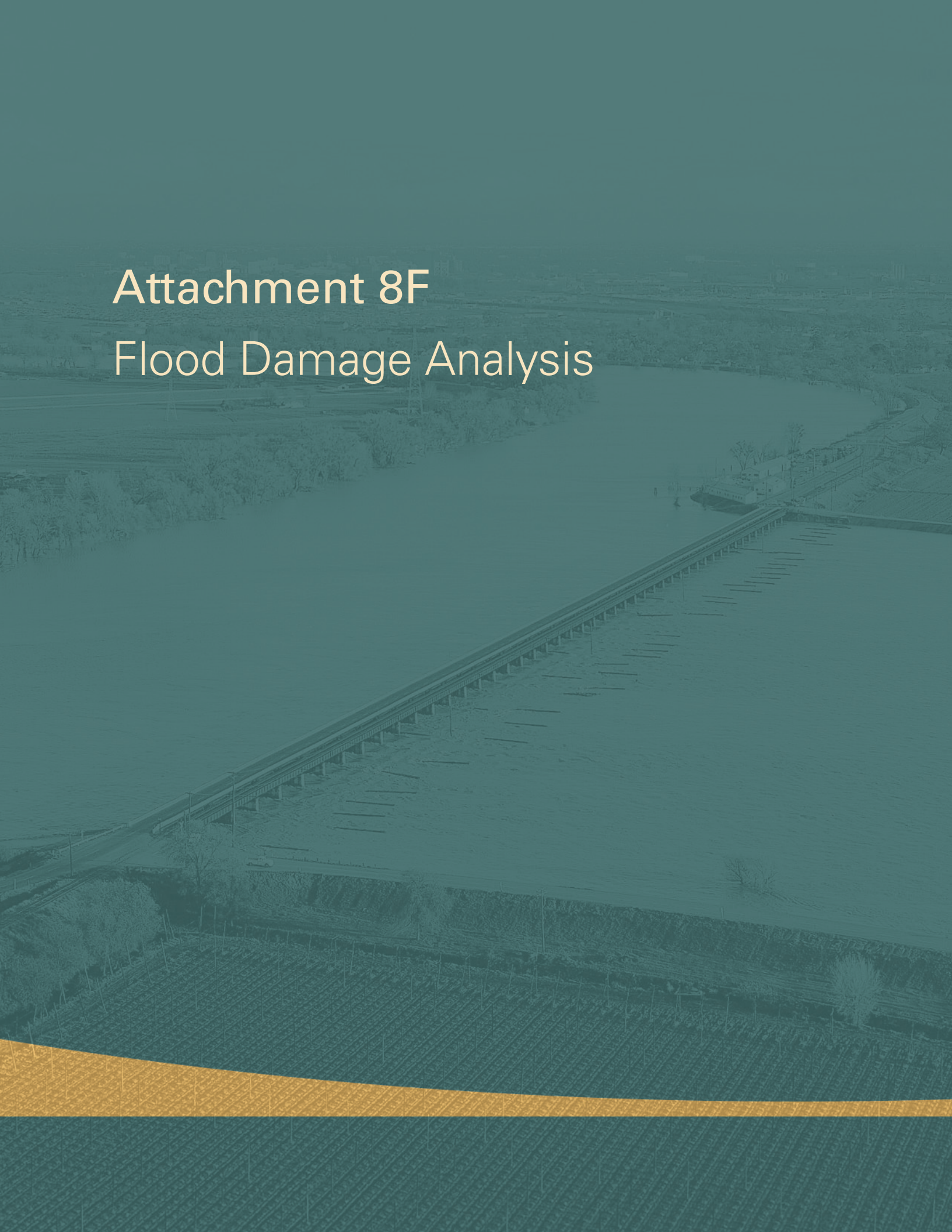
Attachment 8F

Flood Damage Analysis



CENTRAL VALLEY
FLOOD MANAGEMENT
PLANNING PROGRAM

FloodSAFE
CALIFORNIA

2012 Central Valley Flood Protection Plan

Attachment 8F: Flood Damage Analysis

June 2012

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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1.0 Introduction

This section states the purpose of this attachment, gives background information (including a description of planning areas, goals, and approaches), discusses the types of economic flood damage and the national economic development (NED) approach, and provides an overview of the report organization.

1.1 Purpose of this Attachment

There are many ongoing effects to support the development of the 2012 Central Valley Flood Protection Plan (CVFPP). This technical attachment describes the methodology and results from the economic flood damage analyses for the following:

- No Project condition
- Achieve State Plan of Flood Control (SPFC) Design Flow Capacity Approach
- Protect High Risk Communities Approach
- Enhance Flood System Capacity Approach
- State Systemwide Investment Approach

The flood damage analysis of the No Project condition was conducted to provide a baseline for comparison with the four approaches. While the No Project condition is meant to describe the existing conditions of the flood management systems in the Central Valley, it also includes projects that have been authorized and have funding, or that have begun construction or implementation. The No Project condition includes the following:

- Levee improvements in south Yuba County implemented by the Three Rivers Levee Improvement Authority (TRLIA) since 2004 (TRLIA, 2011)
- Natomas Levee Improvement Program by the Sacramento Area Flood Control Agency (SAFCA) (SAFCA, 2011)

- Folsom Dam Joint Federal Project to improve the ability of Folsom Dam to manage large floods by allowing more water to be safely released earlier in a storm event, leaving more storage capacity for capturing peak inflow (Reclamation, 2009)

- Levee improvements along the American River to safely pass a flow of 160,000 cubic feet per second (cfs) as part of the American River Common Features Project (SAFCA, 2011)

- Marysville levee improvements (USACE, 2009)

This technical attachment also documents the following based on the best available data and tools as of September 2011:

- Geographic planning areas relevant to the CVFPP development process.

- Quantitative economic flood damage estimates for structures, contents, crops, and business loss (direct damages) under the No Project condition as a baseline for comparison with other flood risk management approaches.

- Quantitative flood damage estimates for structures, contents, crops, and business loss (direct damages) under the four flood risk management approaches described below.

- Qualitative description of approach for the estimation of emergency costs under a future CVFPP update.

1.2 Background

As authorized by Senate Bill 5, also known as the Central Valley Flood Protection Act of 2008, the California Department of Water Resources (DWR) has prepared a sustainable, integrated flood management plan called the CVFPP, for adoption by the Central Valley Flood Protection Board (Board). The 2012 CVFPP provides a systemwide approach to protecting lands currently protected from flooding by existing facilities of the SPFC, and will be updated every 5 years.

As part of development of the CVFPP, a series of technical analyses were conducted to evaluate hydrologic, hydraulic, geotechnical, economic, ecosystem, and related conditions within the flood management system and to support formulation of system improvements. These analyses were

conducted in the Sacramento River Basin, San Joaquin River Basin, and Sacramento-San Joaquin Delta (Delta).

1.3 CVFPP Planning Areas

For planning and analysis purposes, and consistent with legislative direction, two geographical planning areas were important for CVFPP development (Figure 1-1):

- **SPFC Planning Area –** This area is defined by the lands currently receiving flood protection from facilities of the SPFC (see *State Plan of Flood Control Descriptive Document* (DWR, 2010)). The State of California's (State) flood management responsibility is limited to this area.

- **Systemwide Planning Area –** This area includes the lands that are subject to flooding under the current facilities and operation of the Sacramento-San Joaquin River Flood Management System (California Water Code Section 9611). The SPFC Planning Area is completely contained within the Systemwide Planning Area which includes the Sacramento River Basin, San Joaquin River Basin, and Delta regions.

Planning and development for the CVFPP occurs differently in these planning areas. The CVFPP focused on SPFC facilities; therefore, evaluations and analyses were conducted at a greater level of detail within the SPFC Planning Area than in the Systemwide Planning Area.

Economic flood damage analysis was conducted in the SPFC Planning Area for flood damages to structures, contents, crops, and business losses. Costs related to emergency response and recovery, regional economic impacts, and other social effects are analyzed for the Systemwide Planning Area and the Central Valley.

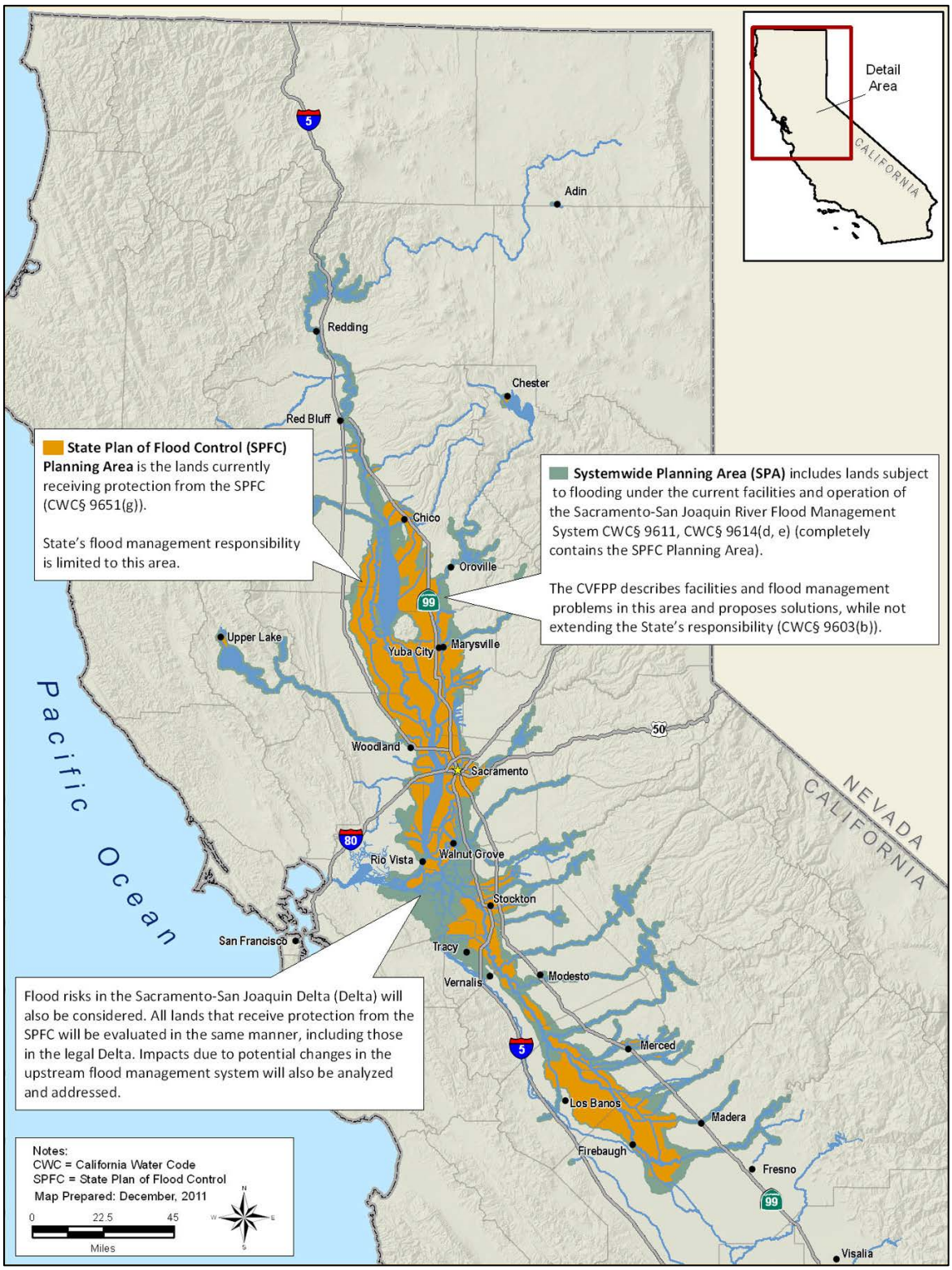

Figure 1-1. Central Valley Flood Protection Plan Planning Areas

1.4 2012 CVFPP Planning Goals

To help direct CVFPP development to meet legislative requirements and address identified flood-management-related problems and opportunities, a primary and four supporting goals were developed:

- **Primary Goal** – Improve Flood Risk Management
- Supporting Goals:
  - Improve Operations and Maintenance
  - Promote Ecosystem Functions
  - Improve Institutional Support
  - Promote Multi-Benefit Projects

1.5 2012 CVFPP Planning Approaches

In addition to the **No Project** approach, three fundamentally different approaches to flood management were initially compared to explore potential improvements in the Central Valley. These approaches are not alternatives; rather, they bracket a range of potential actions and help explore trade-offs in costs, benefits, and other factors important in decision making. The approaches are as follows:

- **Achieve SPFC Design Flow Capacity** – Address capacity inadequacies and other adverse conditions associated with existing SPFC facilities, without making major changes to the footprint or operation of those facilities.

- **Protect High Risk Communities** – Focus on protecting life safety for populations at highest risk, including urban areas and small communities.

- **Enhance Flood System Capacity** – Seek various opportunities to achieve multiple benefits through enhancing flood system storage and conveyance capacity.

Comparing these approaches helped identify the advantages and disadvantages of different combinations of management actions, and demonstrated opportunities to address the CVFPP goals to different degrees.

Based on this evaluation, a **State Systemwide Investment Approach** was developed that encompasses aspects of each of the approaches to balance

achievement of the goals from a systemwide perspective, and includes integrated conservation elements. Figure 1-2 illustrates this plan formulation process.

This attachment documents economic flood damage analyses conducted for the No Project condition and each of the approaches.

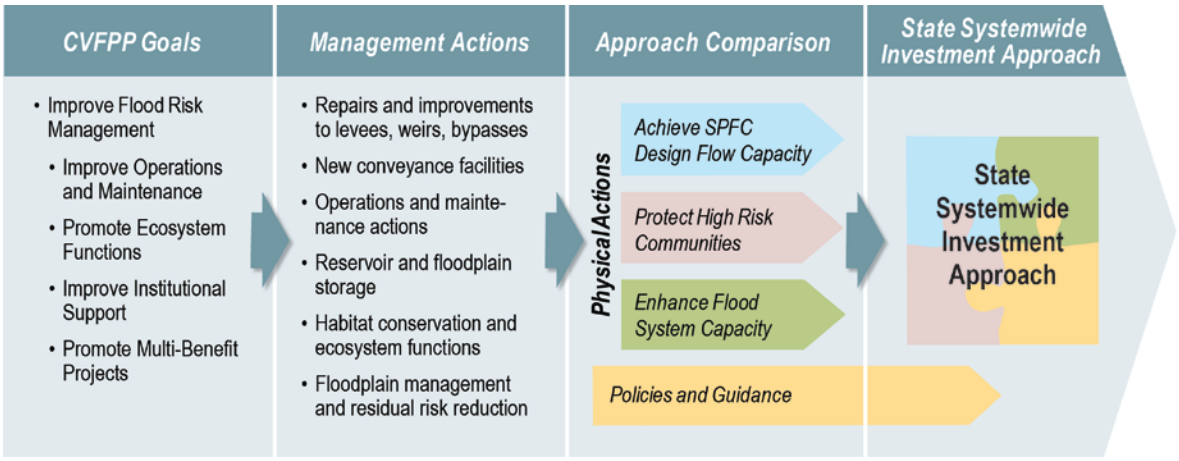

Figure 1-2. Formulation Process for State Systemwide Investment Approach

1.6 Types of Economic Flood Damages

In common with most economic flood damage studies, four types of damages have been defined, as follows:

- Tangible damages include the economic impacts of a flood (e.g., damages to structure and contents of buildings, utility infrastructure, agricultural enterprises).

- Tangible damages, measured in dollars, also include losses from emergency response and disruption of normal economic and social activities that arise from the physical impact of a flood (e.g., costs associated with emergency response; cleanup; community support; disruption to transportation, employment, commerce, tourism).

- Intangible damages consist of losses that are usually not quantified in monetary terms (since market prices cannot be used) (e.g., loss of biodiversity due to habitat damages to the riverbanks).

- Intangible damages also include losses that are also usually not quantified in monetary terms (since market prices cannot be used) (e.g., increase in stress levels for residents following a major flood affecting their homes).

The analyses documented in this attachment focus on (1) quantitative evaluation of tangible flood damages to structure, contents, and crops and (2) a qualitative discussion of other tangible costs related to emergency response and recovery.

1.7 National Economic Development

The *1983 Economic and Environmental Principles and Guidelines* (P&G) *for Water and Related Land Resources Implementation Studies* (WRC, 1983) were established pursuant to the Water Resources Planning Act of 1965 (Public Law 89-80) to promote proper and consistent planning by federal agencies[1] in the formulating and evaluating water and related land resources implementation studies. The federal objective of these studies is to maximize NED through development of an NED plan while protecting the nation's environment, pursuant to applicable laws and requirements. The P&G define the evaluation approach for NED to maximize net benefits.

The CVFPP economic flood damage analyses documented in this attachment adhere to the NED approach. Key elements that comply with the NED approach and U.S. Army Corps of Engineers (USACE) policies and procedures include, but are not limited to, the following:

- Use of risk analysis
- Depreciation of structural value
- Use of uncertainty in first floor elevations, structure values, and contents-to-structure value ratio
- Use of USACE Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) computer program

California's economy is the largest in the United States and, thus, the economies of these two entities are closely linked. It is anticipated that

[1] The federal agencies are U.S. Army Corps of Engineers (USACE), U.S. Department of the Interior, Bureau of Reclamation (Reclamation), Tennessee Valley Authority, and the Natural Resources Conservation Service (NRCS).

implementation of the CVFPP could reduce economic flood damages in the Central Valley of California, increase overall California production, and thus benefit the entire national economy. In other words, implementing the CVFPP could potentially contribute to the NED.

In the future, with appropriate Congressional authorization, California will likely seek federal funding. Using an economic flood damage evaluation compatible with the NED approach could potentially expedite the federal funding process. Also, being compatible with USACE water planning principles and guidelines could help California maximize federal funding.

1.8 Report Organization

Organization of this document is as follows:

- Section 1 describes the purpose of the attachment and provides background information on the CVFPP; describes CVFPP planning areas, the CVFPP planning process, and planning approaches; and discusses types of flood damages and NED.
- Section 2 summarizes results and findings for the economic flood damage analysis.
- Section 3 describes the methodology used in this analysis.
- Section 4 provides complete results for the flood damage analysis by approach.
- Section 5 contains references for the sources cited in this document.
- Section 6 lists abbreviations and acronyms used in this document.

2.0 Results Summary and Findings

Results of the flood damage analysis are given as Estimated Annual Damages (EAD). EAD is not a predictor of damages for a given year, but rather indicates the annualized damages from periodic flooding. For this study, the EAD has three components:

- Annual structure and contents damage
- Annual crop damage
- Annual business losses

Figures 2-1 and 2-2 indicate the total EAD, as well as the components listed above, for the Sacramento and San Joaquin river basins, for the No Project Condition and for each of the four flood management approaches.

In the Sacramento River Basin, the Enhance Flood System Capacity Approach provides the largest reduction in economic flood damages, followed by the State Systemwide Investment Approach (SSIA). This is likely because of the larger percentage of the damages in the basin that would occur in urban areas, and both of these approaches would provide 200-year protection to urban areas plus new and widened bypasses and lengthened weirs.

In the San Joaquin River Basin, the Enhance Flood System Capacity (EFSC) Approach provides the largest reduction in economic flood damages, followed by the Achieve SPFC Design Flow Capacity Approach. This is because of a larger percentage of the damages in the basin would occur in rural areas and both of these approaches would restore all SPFC levees to Design Flow Capacity, including rural areas.

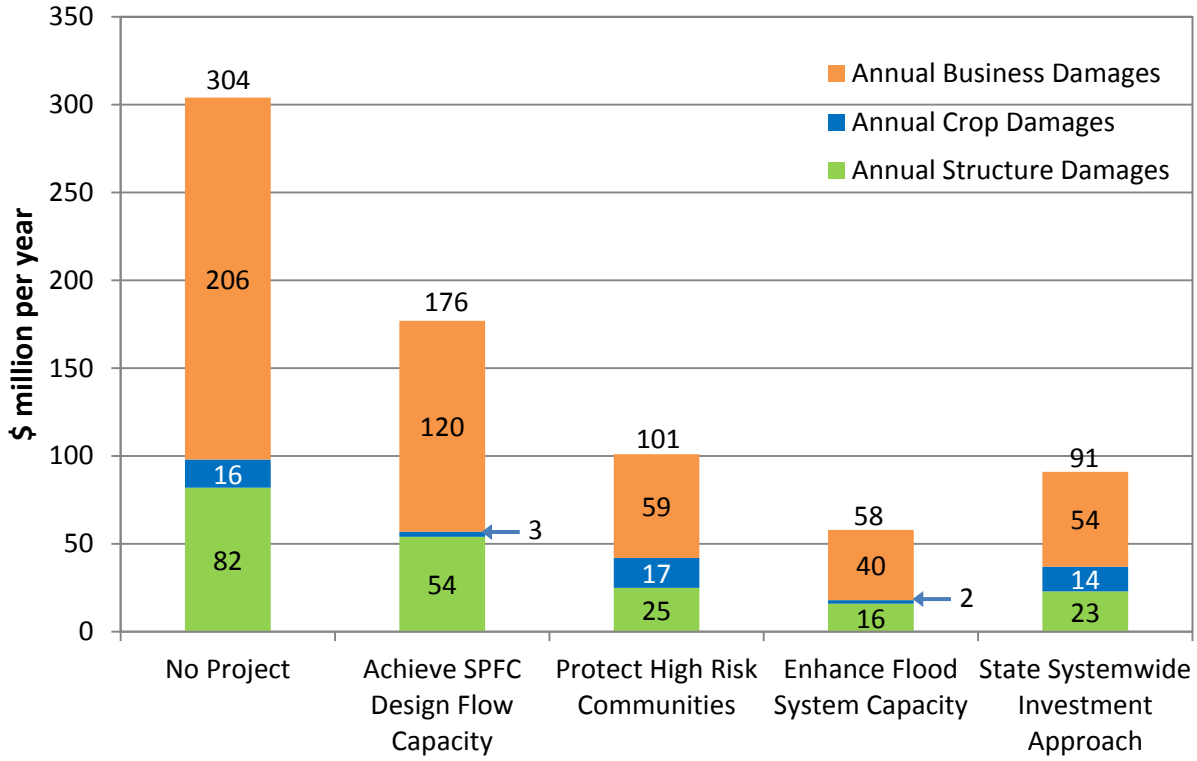

Figure 2-1. Sacramento River Basin Estimated Annual Flood Damages

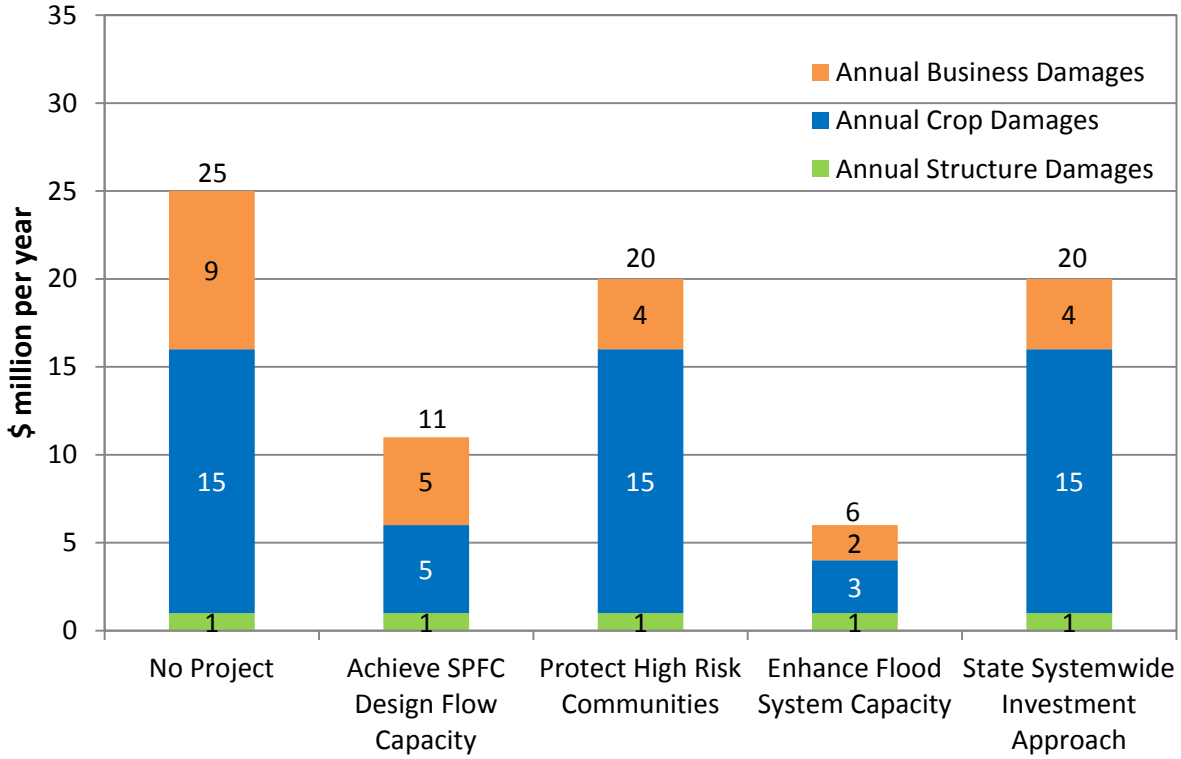

Figure 2-2. San Joaquin River Basin Estimated Annual Flood Damages

3.0 Flood Damage Analysis Methodology

Structure value has evolved as the most widely used indicator of potential economic flood damages and, generally, structure and contents values make up the majority of avoided damages or benefits associated with flood damage reduction projects. Vehicles are a structure contents subcategory that typically represents a small percentage of project damages and were not anticipated to have significant bearing on plan formulation. For agricultural areas, crop loss has been the major economic flood damage category. This document focuses on quantifying the economic flood damages for structures and contents, crops and business losses.

In general, the CVFPP flood damage quantitative analysis for structures, contents, and crops in the Sacramento and San Joaquin river basins follows a similar methodology to that used for the *U.S. Army Corps of Engineers* (USACE) *Sacramento and San Joaquin Basins Comprehensive Study* (Comprehensive Study) (2002a). Structural damages are referred to in this attachment as inundation damages associated with a building structure and its contents, crop damages as damages associated with inundation of agricultural lands. Business losses were not analyzed in the Comprehensive Study, but are used in this attachment to describe direct flood damages associated with decreased business activity caused by flooding.

This section describes overall methodology and common inputs for structural and crop damages. Specific details of structural and crop damages and business losses are given in Section 4.

3.1 Comprehensive Study

In response to extensive flooding and damage experienced during the floods of 1997, Congress authorized the USACE, Sacramento District, to undertake the Comprehensive Study, a comprehensive analysis of the flood management systems in the Sacramento and San Joaquin river basins, and to develop plans for reducing flood damages and improving the riverine environment (USACE, 2002a).

Multidisciplinary modeling and analysis tools were developed and used for the Comprehensive Study. The tools provided hydrologic, hydraulic, geotechnical, economic, and environmental analysis. The CVFPP follows a similar analytical approach for these two river basins. The Calaveras River and Bear Creek in the Stockton area were not evaluated in the Comprehensive Study; however, a similar approach was applied in the Stockton area for the CVFPP with slightly different tools. Details of the modeling and analysis applied to the Stockton area can be found in Attachment 8C: Riverine Channel Evaluations.

3.2 Overall CVFPP Modeling Framework

During CVFPP development, flood management approaches were identified and their corresponding EAD were developed and compared against the No Project condition EAD to determine their effectiveness as flood management strategies. Multiple modeling tools and analyses were conducted to support the approach evaluation (Figure 3-1); using existing tools that were updated with best available data.

The technical tools needed for the evaluation include hydrology that is used to develop unregulated flow hydrographs into reservoirs and streams. Next, reservoir models are used to simulate regulated flows for input to the downstream river hydraulic models. The regulated flows downstream from reservoirs and unregulated local flows are sent to the river hydraulic models that are used to simulate water stages, flow rates, levee breaches, out-of-system flows, etc., in the rivers. Geotechnical studies identify levee failure probability used both in the river hydraulic models to determine levee breaches and subsequent out-of-system flows, and in the economic models to determine stage-damage curves. Economic models identify damages using stage-damage curves derived from structure and crop inventories. Any CVFPP management actions could change some of the model inputs and thus change the EAD.

Input sources for the economic flood damage analysis are summarized below:

- Levee performance curves using data developed for the Urban Levee Evaluation (ULE) Project and the Non-Urban Levee Evaluation (NULE) Project under the DWR FloodSAFE California (FloodSAFE) Levee Evaluation Program (see Attachment 8E: System/Levee Performance for details).

- Hydraulic modeling outputs from (1) UNET (Unsteady flow through a NETwork of open channels) models for the Sacramento and San

Joaquin river basins, (2) RMA Delta Model for Delta islands, and (3) Hydrologic Engineering Center River Analysis System (HEC-RAS) for the Stockton area (see Attachment 8C: Riverine Channel Evaluations and Attachment 8D: Estuary Channel Evaluations for details).

- Flood depth information derived from (1) Comprehensive Study FLO-2D[2] flood depth grids, and (2) FLO-2D flood depth grids for Stockton area

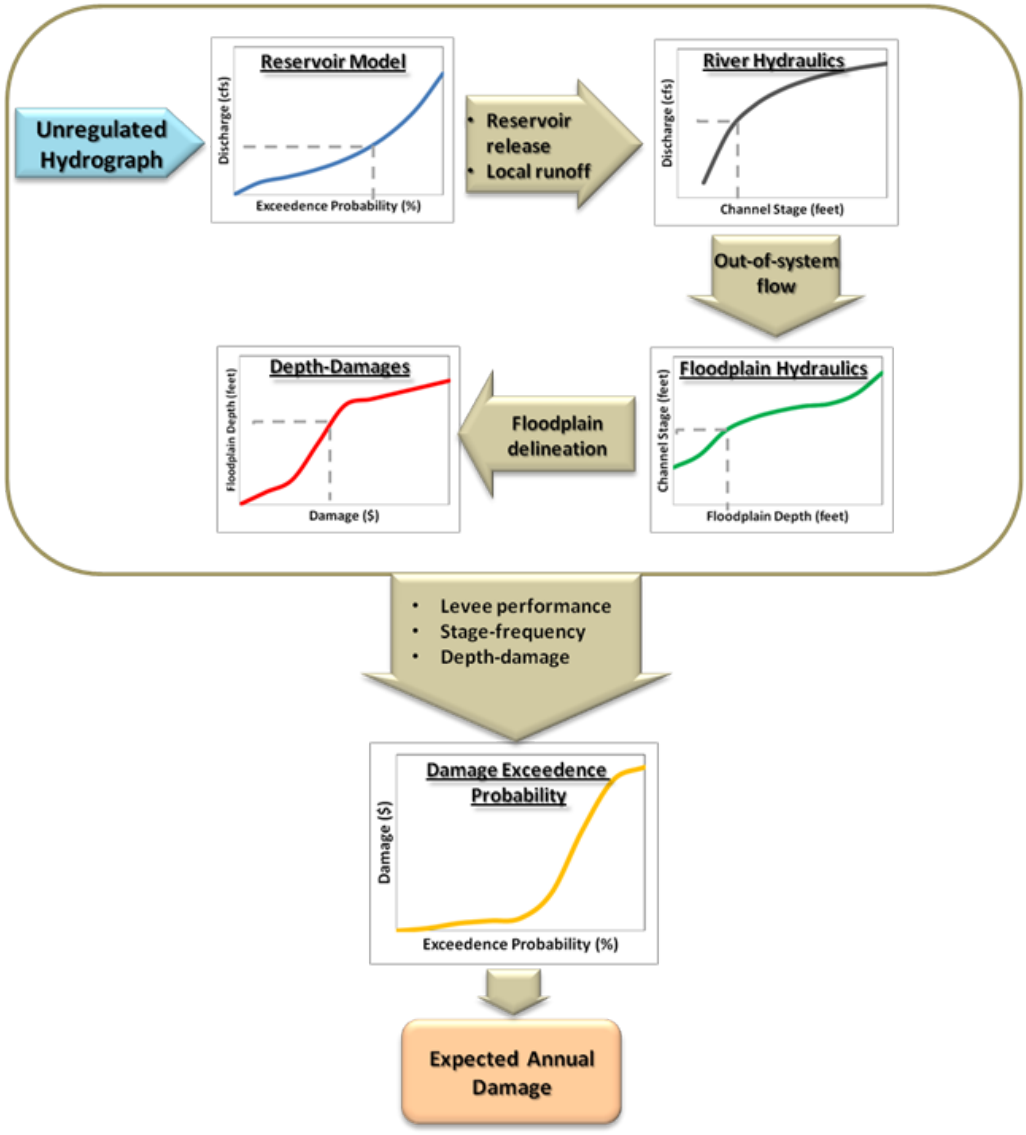

Figure 3-1. Schematic of Overall Modeling Framework

[2] FLO-2D is an integrated river and floodplain model developed by FLO-2D Software, Inc. It is a dynamic flood routing model that simulates channel flow, unconfined overland flow, and street flow, with consideration of topography and roughness.

- A reconnaissance-level structure inventory developed using field surveys conducted in 2010 and 2011
- DWR May 2010 spatial geographic information system (GIS) dataset for Central Valley landuse conditions, focusing on agricultural lands
- Comprehensive Study agricultural damage spreadsheets (Ag damage spreadsheet) (USACE 2010b)
- USACE contents-structure ratios and depth-damage functions (USACE, 2008)

3.3 Flood Damage Reduction Analysis Methods

In the Comprehensive Study, USACE used the HEC-FDA computer program to analyze flood inundation damage and project performance by return period and EAD. The HEC-FDA program provides state-of-the-art analysis for formulating and evaluating flood damage reduction plans using risk-based analysis methods.

The HEC-FDA calculations took into account information and uncertainties from interrelated hydrologic, hydraulic, geotechnical, and economic information (UASCE, 2002b), as follows:

- **Hydrologic** − A discharge-frequency function describes the probability of floods equal to or greater than a given discharge. Uncertainty factors include hydrologic data record lengths that are often short or do not exist, precipitation-runoff computational methods that are not precisely known, and imprecise knowledge of flow regulation effectiveness.
- **Hydraulics** − A stage-frequency function describes the maximum water surface elevation (stage) that the flow of water in a river channel would reach for a given annual exceedence probability (AEP) flood event. Uncertainty in this number may be from the use of simplified models to describe complex hydraulic phenomena, including the lack of detailed geometric data, misalignments of hydraulic structures, material variability, and errors in estimating slope and roughness factors.
- **Geotechnical** − A geotechnical levee performance curve describes levee failure (breach) probabilities corresponding to water stages in a channel. As the stage on the channel side of a levee rises, the probability of levee failure increases. Once a levee fails and water enters the floodplain through the resulting breach, stages in the floodplain are applied in the HEC-FDA computation. Uncertainty

results from estimation of the geotechnical performance of levees and flood control structures during floods. Other uncertainties may include assumptions for geotechnical parameters, mathematical simplifications in the analysis models, frequency and magnitude of physical changes or failure events, and the uncertainty of unseen features such as rodent burrows, cracks within the levee, or other defects.

- **Flood Damages** − A stage-damage function describes the amount of damage that might occur given certain floodplain stages. Uncertainty may be from land uses, depth/damage relationships, structure/contents values, structure locations, first-floor elevations, floodwater velocity, the amount of debris and mud, flood duration, and warning time and the response of floodplain inhabitants. Some of these uncertainties (warning time and response) are not accounted for in the flood damage analysis.

To quantify the above uncertainties and incorporate them into an economic and engineering performance analysis, HEC-FDA applies Monte Carlo simulation, a numerical-analysis procedure that computes the expected value of damage while explicitly accounting for uncertainty in basin parameters used to determine flood inundation damage. Additional information can be found in the *HEC-FDA User's Manual* (USACE, 2008a)

3.4 Flood Damage Analysis Output Types

The primary outputs of HEC-FDA for flood damage analysis in this attachment are as follows:

- EAD is defined as the average or mean of all possible values of damage determined by Monte Carlo sampling of stage-exceedence probability, the geotechnical levee performance curve, and stage-damage relationships and their associated uncertainties. EAD is calculated as the integral of the damage-probability function.

- Expected annual exceedence probability (AEP) measures the chance of a flood occurring in any given year.

- Long-term risk provides the probability of one or more damaging floods occurring over a period of time (10-, 30-, and 50-year periods).

- Conditional nonexceedence probability for flood events (i.e., the probability of passing specific flood events) of 10, 4, 2, 1, 0.4, and 0.2 percent (10-, 25-, 50-, 100-, 200-, and 500-year return period).

3.5 CVFPP HEC-FDA Coverage

The total floodplain area protected by the SPFC in the Sacramento and San Joaquin river basins is approximately 2.1 million acres (or about 3,300 square miles). These floodplains are not homogenous; they contain areas subject to different types of flooding. For example, the Colusa Basin in the upper Sacramento River Basin is prone to "overland" flooding while areas in and near the Delta in the lower San Joaquin River Basin are prone to "bathtub" flooding. In HEC-FDA, floodplains are represented by a collection of damage areas for (1) the Sacramento River Basin, (2) the San Joaquin River Basin, and (3) the Stockton area. HEC-FDA simulations are performed for each damage area in the CVFPP.

The Sacramento River Basin is represented by 63 damage areas (about 1.36 million acres in total, Figure 3-2) and the San Joaquin River Basin by 43 damage areas (about 0.70 million acres in total, Figure 3-3). The original Comprehensive Study damage areas in these two basins were revised by DWR in early 2010 within the 500-year (0.2 percent) floodplains[3] to include the largest flood deemed reasonably possible. There are six damage areas in the Stockton area (about 60,000 acres in total, Figure 3-3) covering areas inside SPFC Planning Area but outside of Comprehensive Study HEC-FDA for the San Joaquin River Basin.

Each damage area is unique and is located along a stream or waterway with beginning and ending stations. As described above, each damage area extends to include the 500-year floodplain. Each damage area has a unique index point on a bounding watercourse, where channel and floodplain water surface elevations are coupled. The index point, which represents its corresponding section of river reach and the properties of the levees, is also the location where flood damages for a damage area (through the stage-damage function) are developed, and then linked to hydrology, hydraulics, and geotechnical considerations through a Monte Carlo simulation to calculate a flood risk. The index point location for each damage area has been defined through the ULE and NULE efforts and is shown in Attachment 8E: Levee Performance Curves.

[3] DWR used the 500-year floodplain GIS file from the Comprehensive Study to modify the damage area boundaries in early 2010. The intent of the modification was to better align the damage areas with the floodplain boundary. Portions or the entirety of the cities of Chico, Davis, Los Banos, Merced, Tracy, and Woodland are inside the SPFC planning area, but their flood damage effects were not evaluated under the CVFPP because the Comprehensive Study did not develop HEC-FDA damage areas for each of these cities. It is anticipated that these cities will be part of the 2017 CVFPP flood damage analysis.

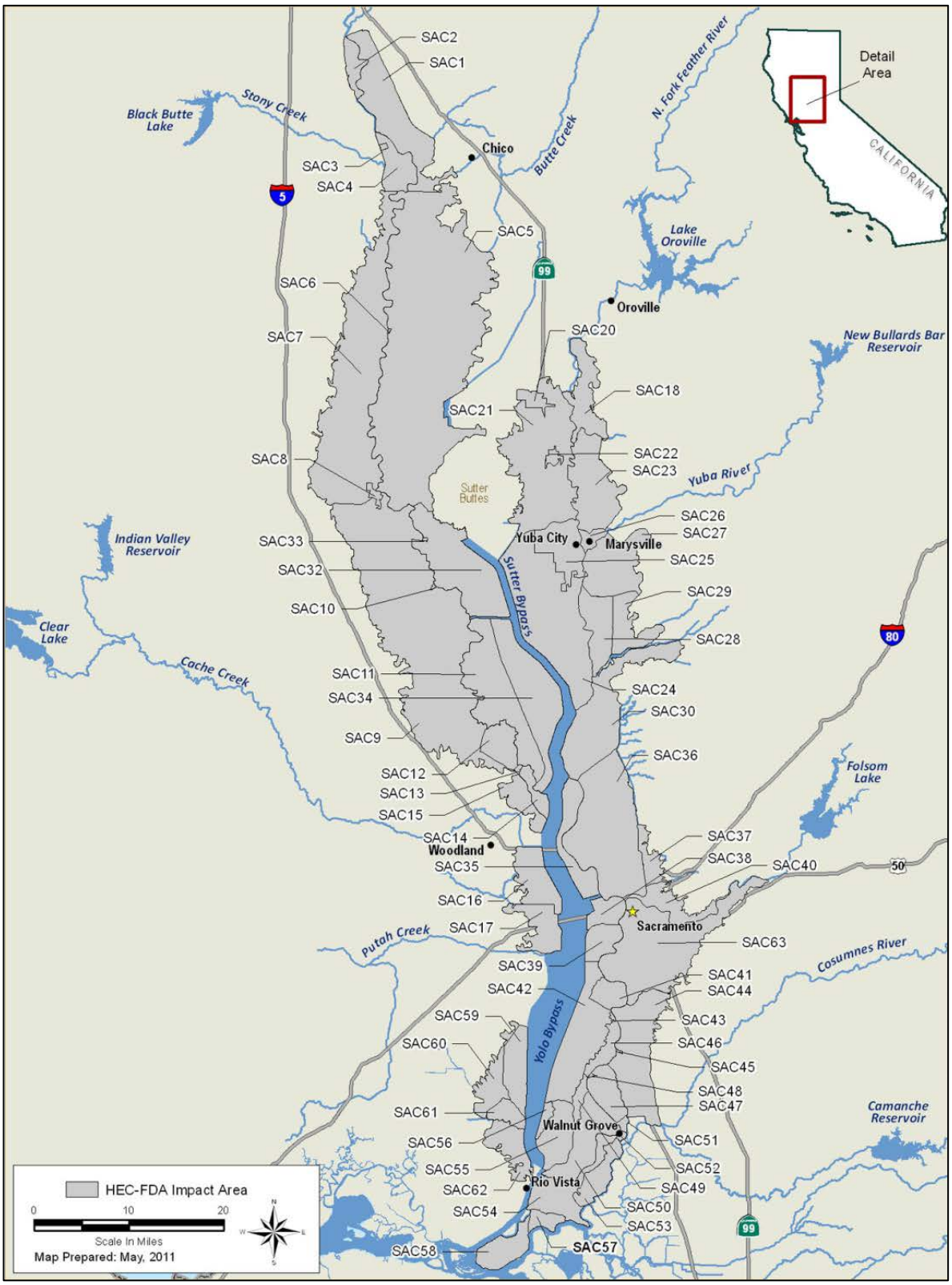

Figure 3-2. HEC-FDA Damage Areas in Sacramento River Basin

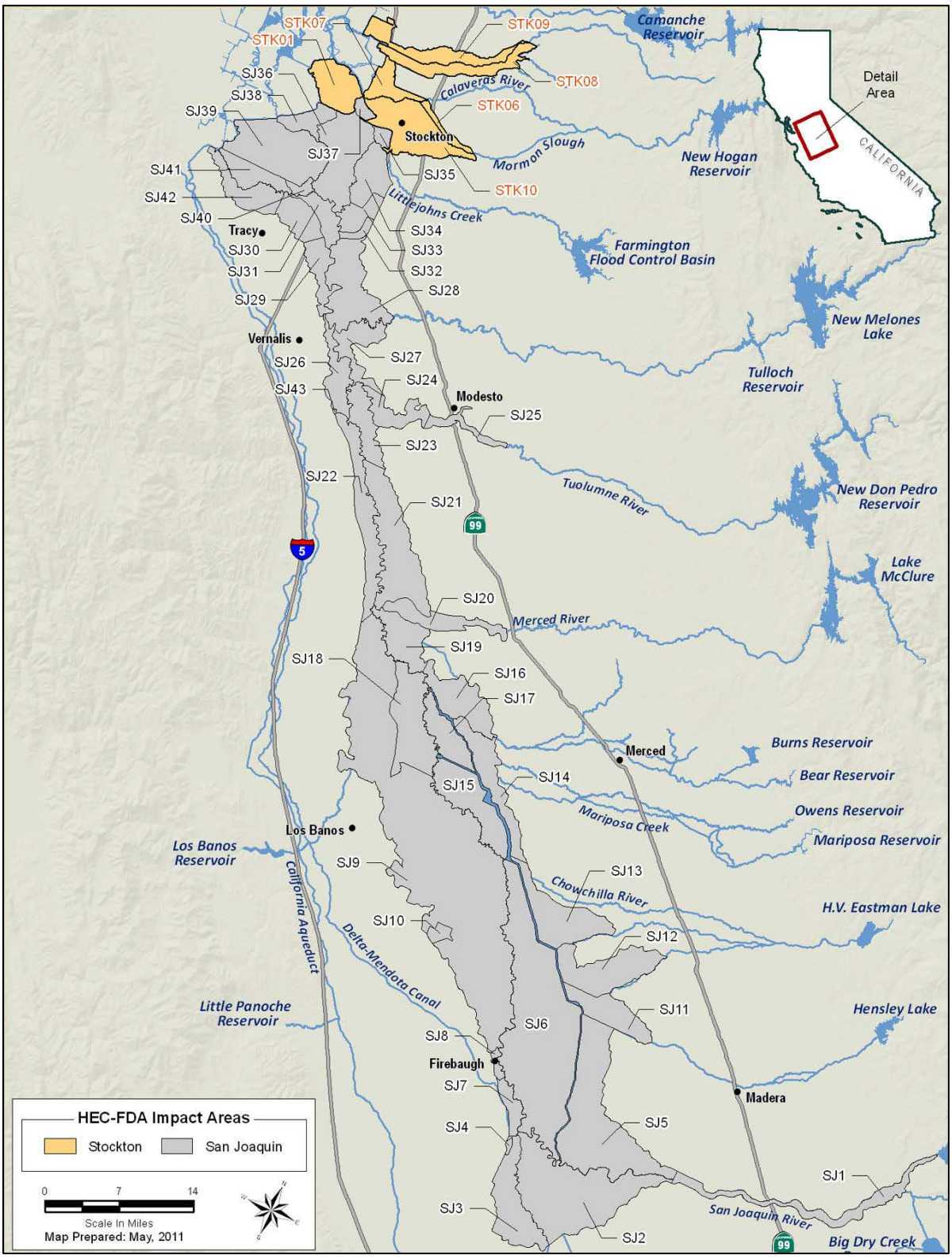

Figure 3-3. HEC-FDA Damage Areas in San Joaquin River Basin and Stockton Area

3.6 Major HEC-FDA Inputs

Risk analyses for structure and crop damage require three types of hydraulic and geotechnical inputs to HEC-FDA:

- Stage-frequency curve (stream hydraulics and hydrology)
- Levee performance curve (geotechnical considerations)
- Flood depth grid (floodplain hydraulics)

3.6.1 Stage-Frequency Curve

For each damage area, the stage-frequency curve function at the corresponding index point was developed and incorporated into the HEC-FDA as input based on flood events with AEPs of 10, 4, 2, 1, 0.5, and 0.2 percent (10-, 25-, 50-, 100-, 200-, and 500-year return period). UNET simulations for a 100 percent AEP were not performed because hydrology for this event was not available; instead, stages for the 100 percent AEP (1-year return period event) at each index point are based on the interior levee toe elevations (as developed by the ULE and NULE projects in DWR's Levee Evaluation Program). Assumptions from the Comprehensive Study hybrid stage-frequency curves were applied in cases where no other data were available.

In some reaches, simulated stages were substantially below the levee failure elevation, especially in downstream reaches. This was due to the progressive loss of floodwater through multiple upstream levee breaches. After a levee breach occurs, the water surface elevation remains relatively constant for all higher flood frequencies because flows are escaping into the floodplain through the levee breach, causing the stage-frequency curves to tail over or flatten at the breach elevation. Monte Carlo sampling in HEC-FDA requires a stage-frequency curve that covers a full range of potential flood frequencies. Consequently, two sets of simulations were required to construct the stage-frequency curves in reaches with levees: one that assumes levee failures occur (termed finite channel, see Figure 3-4) and one that assumes all flow is contained within the channel (termed infinite channel, see Figure 3-4). The portion of the curve below the levee failure point is developed using the levee-failure simulations and the upper portion of the curve above the frequency of levee failure is formed using the infinite channel simulation in which the stage-frequency curve always increases.

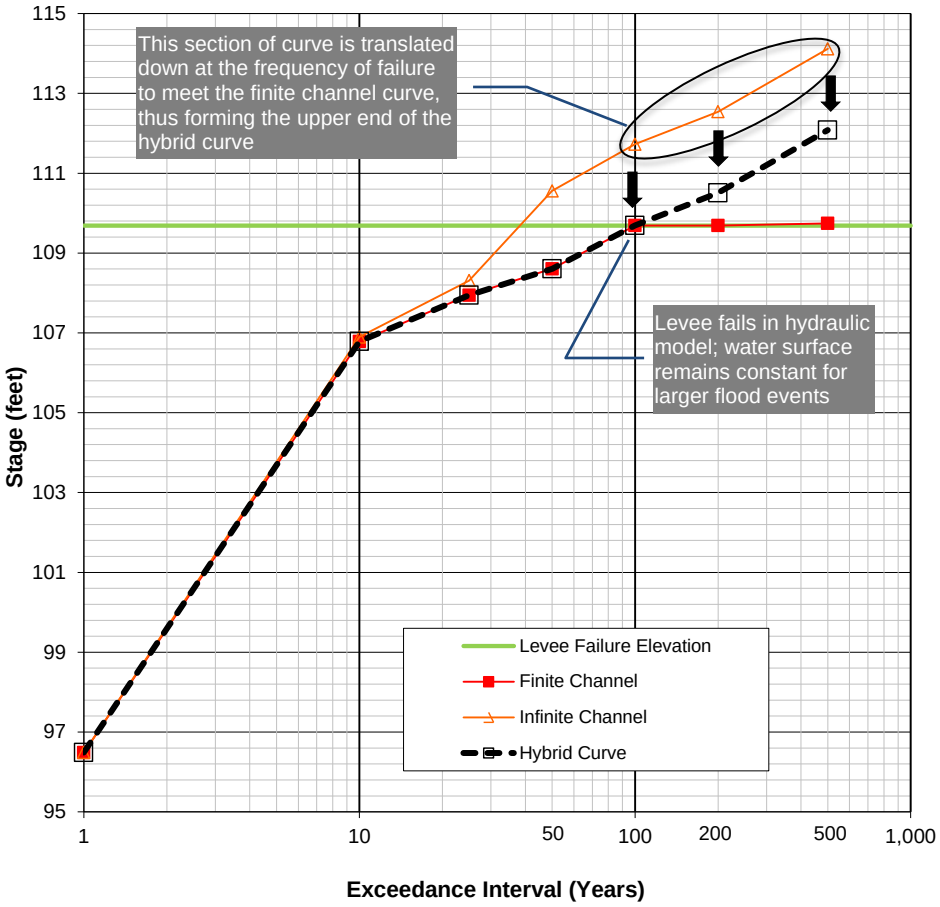

Figure 3-4. Example of Hybrid Stage-Frequency Curve

UNET was used to simulate in-channel flow rates and stages, and flows leaving river channels through breaches and entering the floodplain under different levee failure scenarios based on levee performance curves described in the following section. In-channel hydraulic information from UNET was used to develop a hybrid stage-frequency curve at the index point of each damage area. Figure 3-4 shows an example of a hybrid stage-frequency curve for an index point of a damage area. Details of the methodology to develop hybrid stage-frequency curves are described in the Comprehensive Study Technical Studies Documentation, Appendix E (USACE, 2002b).

3.6.2 Levee Performance Curve

Levee performance curves establish geotechnical relationships between river water stage and the probability that a levee segment will fail or breach (water from the waterside of the levee flows in an uncontrolled manner to the landside of the levee) at that stage. Under the ULE Project, levee

performance curves were developed for levees (subdivided into reaches ranging in length from 1,000 to 3,000 feet) protecting populations of 10,000 or more people through (1) about 400 miles of SPFC levees, and (2) appurtenant non-SPFC levees. The NULE Project developed levee performance curves for levees (in 2- to 25-mile-long segments) protecting populations of fewer than 10,000 people (see Attachment 8E: System/Levee Performance for details).

During curve development, four levee failure modes were considered: steady-state under-seepage, steady-state through-seepage, steady-state landside stability, and erosion. Past flood information, field data, and laboratory geotechnical data were used to calculate or validate the levee performance curves. Note that, although an earthquake could cause damage resulting in a levee to breach, levee performance curves from the NULE and ULE projects did not consider the potential risk from seismic activities on levee breach.

Levee failure conditions for each approach are described in Attachment 8E: System/Levee Performance for the Sacramento River and San Joaquin river basins and Attachment 8C: Riverine Channel Evaluations for the Stockton area. Riverine hydraulic results (Attachment 8C: Riverine Channel Evaluations) that account for the likely performance of upstream levees were used to generate hybrid stage-frequency curves as inputs to the CVFPP HEC-FDA as described above.

3.6.3 Flood Depth Grid

A key input to HEC-FDA is a flood depth grid for each floodplain for various flood events. For each damage area, flood depth information was overlaid on the geospatial structure and crop inventory to estimate the total structure and crop damages under different flood events and thus develop the stage-damage relationship (development of flood depth grid information for the Stockton area is described in detail in Attachment 8C: Riverine Channel Evaluations). This section describes the derivation of flood depth information from the Comprehensive Study FLO-2D outputs for the Sacramento and San Joaquin river basins. Simulated maximum floodplain water depths for the Sacramento and the San Joaquin river basins in the Comprehensive Study are shown in Figures 3-5 and 3-6, respectively.

Under the 2002 Comprehensive Study, USACE developed a set of levee performance curves for the No Project condition UNET simulation. No Project condition UNET overbank flow results were then used in FLO-2D floodplain models to generate flood depth grids for the 10-, 50-, 100-, 200-, and 500-year floods.

Under the CVFPP, a new set of levee performance curves (see Attachment 8E: System/Levee Performance) and other assumptions were developed and incorporated into the UNET models to represent the different approaches. New flood depth grids for the No Project condition, as well as for the four approaches, were derived from the Comprehensive Study FLO-2D outputs as described below.

The interior floodplain depth is a combination of three factors: 1) the levee breach location; 2) when the levee breaks in relation to the stage in the river; and 3) the period of time during which floodwaters enter the floodplain through the levee breach.[4] Assumptions (e.g., new levee performance curves) made in the CVFPP result in differences between the factors described above as used in the CVFPP and the Comprehensive Study. As a result, the original Comprehensive Study interior-exterior stage relationships (i.e., the relationship between water depth in the floodplain and water stage in the river) could not be used in the CVFPP.

It was therefore necessary to derive new interior-exterior stage relationships based on the assumption that the total volume of water entering the floodplain, and the resulting interior stage, is proportional only to the exterior (river) stage and not the physical location, exceedence probability, or duration of the levee breach. By comparing a CVFPP exterior stage with a Comprehensive Study exterior stage at an index point, a new interior floodplain depth can be derived for any given hydraulic model run in the CVFPP. The new interior floodplain depth and associated exterior stage are applied as FDA inputs for that particular hydraulic model run.

A land parcel in Damage Area SJ14 was selected as an example to illustrate the derivation process. First, interior water depth for the land parcel and a given flood AEP was taken from the Comprehensive Study FLO-2D No Project flood depth grid. Next, the UNET exterior (in-channel) water stage at the index point corresponding to the parcel was extracted from the Comprehensive Study UNET runs for all flood AEPs. The data points were then plotted (see Comprehensive Study Baseline data in Table 3-1 and Figure 3-7) to develop a Comprehensive Study interior-exterior stage curve.

[4] In UNET, levee breaches are simulated using simple failure mode. The simple failure method, identified by the SF record, uses a simple spillway concept whereby the volume of available storage multiplied by a linear routing factor gives flow through the breach. This simple method, often used in cases where the details of a breach are unknown, does not simulate the erosion of material from the breach, but assumes a maximum breach length. This method acknowledges that flow into the storage area is proportional to available storage; thus, flow is greatest at the onset of the breach and decreases as the available floodplain storage decreases.

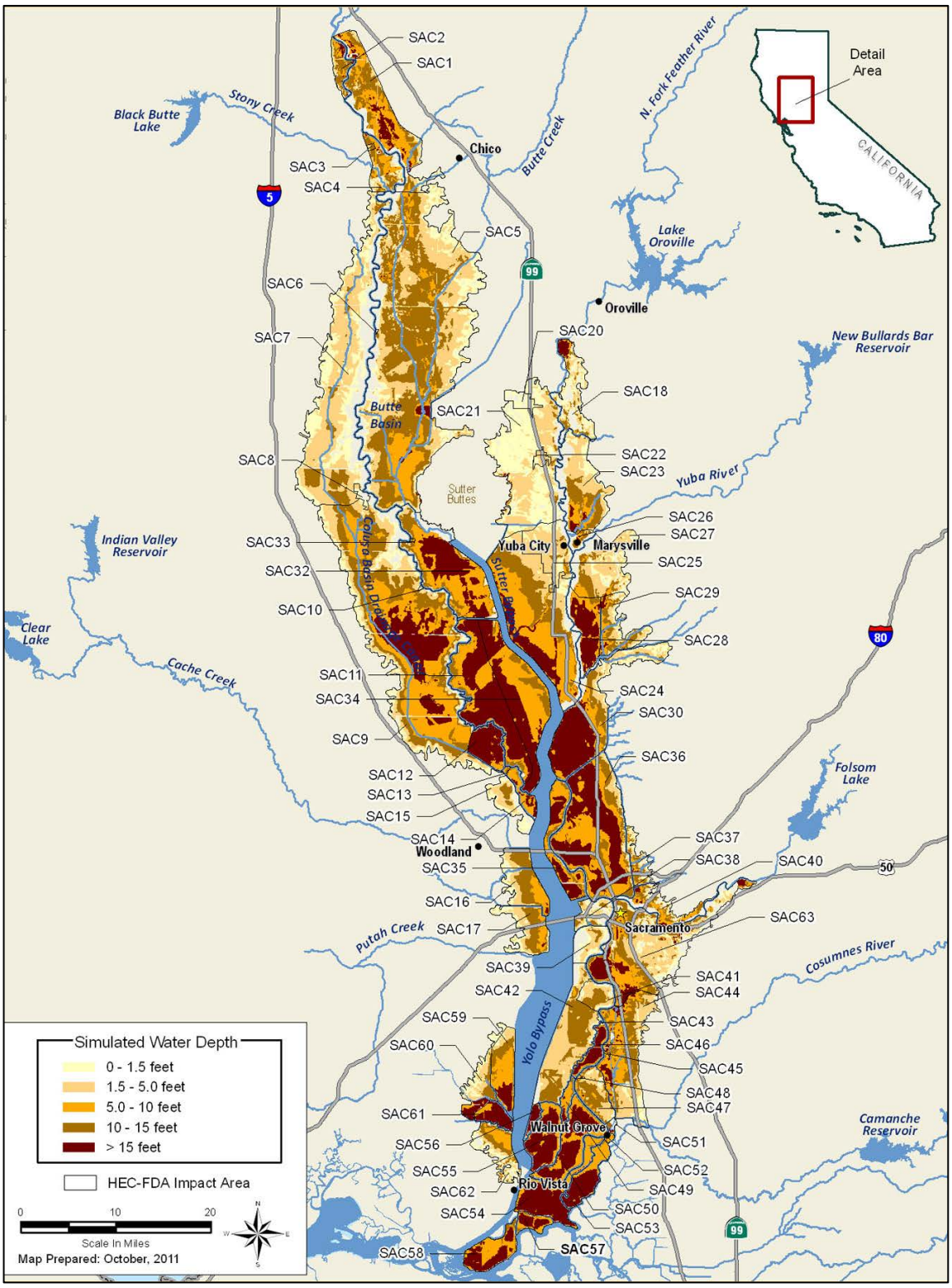

Figure 3-5. Simulated Maximum Water Depths for Sacramento River Basin in Comprehensive Study

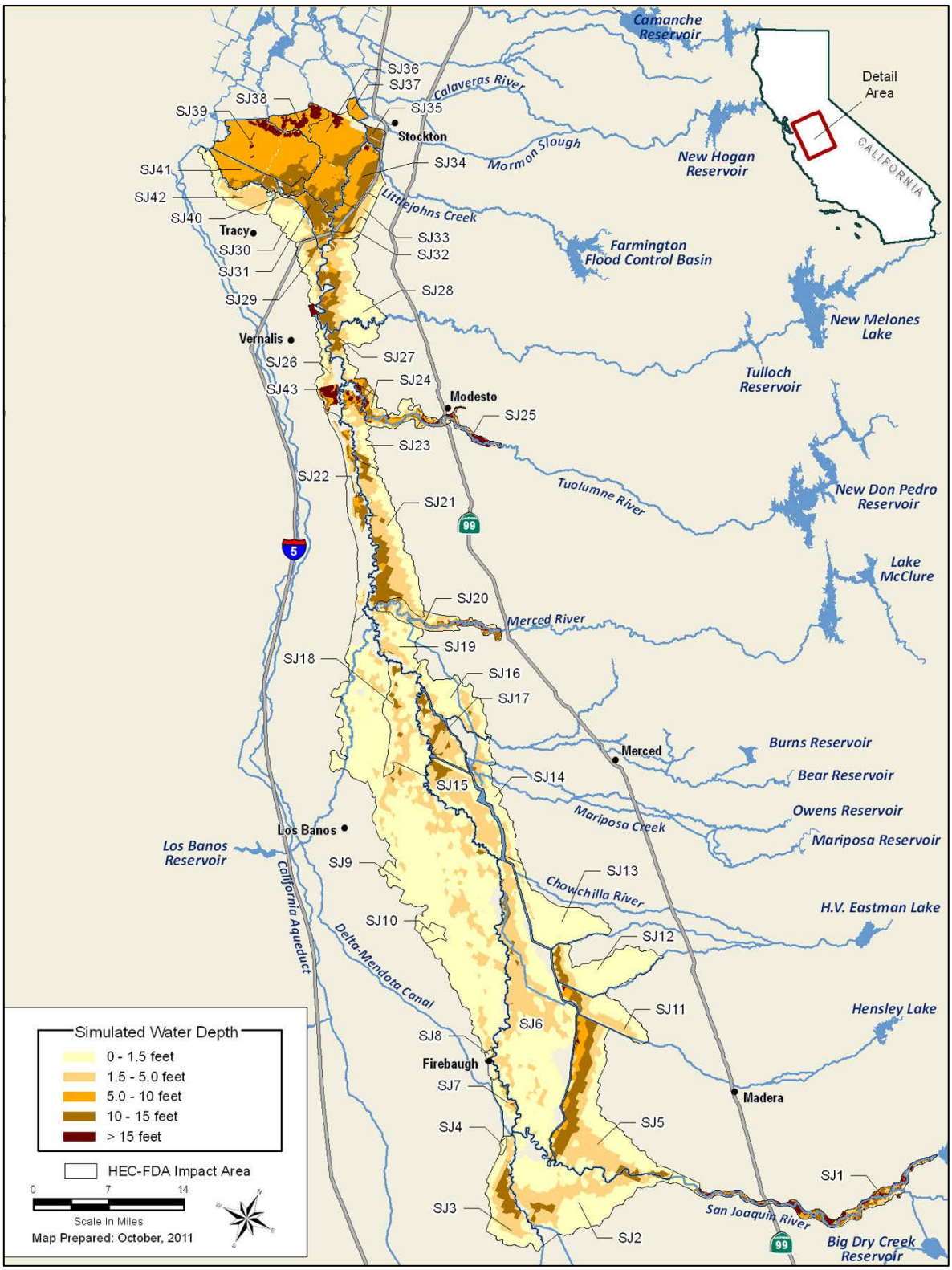

Figure 3-6. Simulated Maximum Water Depths for San Joaquin River Basin in Comprehensive Study

A new exterior stage-frequency curve at the SJ14 index point was developed from UNET for the CVFPP (see CVFPP No Project condition in Table 3-1). Using the original interior-exterior stage-frequency relationship taken from Comprehensive Study data give the curve shown in Figure 3-7. Interior water depths at the parcel related to the new CVFPP stages at the SJ14 index point can be identified through interpolation (extrapolation in some cases), as shown by the red dots in Figure 3-8 for each exterior (river) stage. The interior water depths at the parcel for the CVFPP No Project condition were taken from Figure 3-8, as shown in Table 3-1. The interior-exterior curve was extended down to the interior toe of the levee because when the maximum exterior water stage is below the interior levee toe elevation, levee failure probability is assumed to be zero, and the interior grid is dry (zero water depth). The approach described above was repeated to develop new flood depth stages for all parcels in each of the damage areas.

Table 3-1. Interior and Exterior Water Stage Data for SJ14 Index Point and Parcel

	AEP (percent)				
	10	**2**	**1**	**0.5**	**0.2**
Comprehensive Study Baseline					
SJ14 Index Point River Stage (feet, from UNET)	107.21	108.27	109.61	110.33	110.58
Water Depth at a parcel (feet, from FLO-2D)	0.00	2.68	4.82	5.20	5.44
CVFPP No Project					
SJ14 Index Point River Stage (feet; from UNET)	107.31	107.44	107.46	107.56	108.88
Water Depth at a parcel (feet; from interpolation)	0.26	0.58	0.62	0.89	3.65

Key;
AEP = annual exceedence probability
APN = Assessor Parcel Number
Comprehensive Study = USACE 2002a, Sacramento and San Joaquin River Basins Comprehensive Study
CVFPP = Central Valley Flood Protection Plan

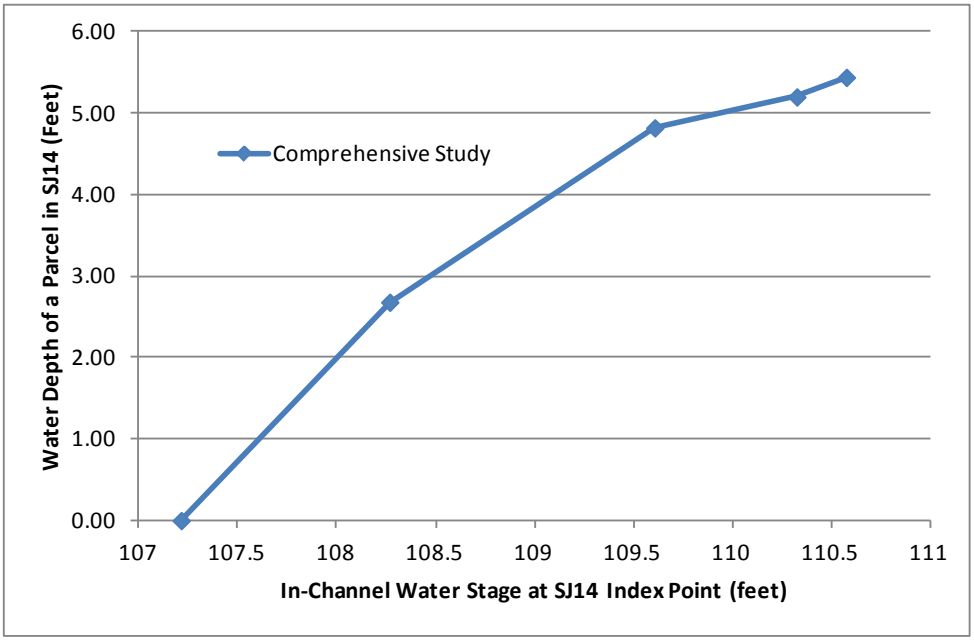

Figure 3-7. Interior-Exterior Stage Curve from Comprehensive Study for a Parcel in Damage Area SJ14

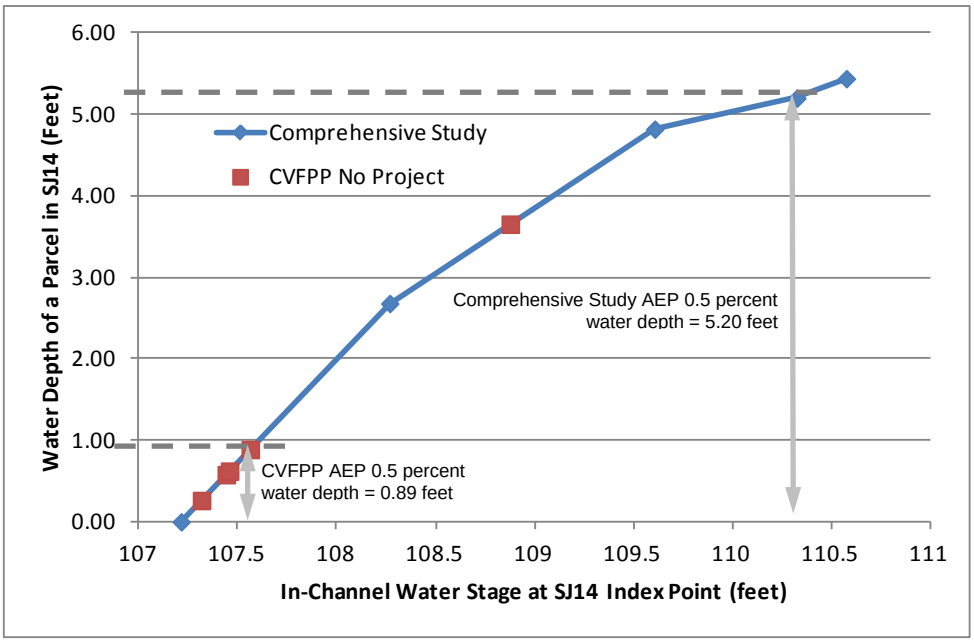

Figure 3-8. Interpolated Interior Water Depth Based on Interior-Exterior Curve for a Parcel in Damage Area SJ14 and New CVFPP No Project Exterior Water Stages

3.7 Structure Inventory Development

Development of a structure inventory is an integral step in the economic flood damage analysis. This section describes the context and methodology for the structure inventory. In general, the following steps were taken to complete the economic flood damage analysis:

- **Step 1** – Develop a structure inventory by conducting a reconnaissance-level field survey for areas inside the CVFPP HEC-FDA damage areas in the Sacramento and San Joaquin river basins and the Stockton area.
- **Step 2** – Populate missing data based on existing parcel data and survey results.
- **Step 3** – Identify building costs per square foot, and calculate the structure and contents cost for each structure inside the CVFPP HEC-FDA damage areas of the Sacramento and San Joaquin river basins.
- **Step 4** – Calculate total damages (summation of structure and contents damages) under different floods in HEC-FDA based on the derived depth grids from the Comprehensive Study FLO-2D outputs and depth-damage functions to develop the stage-damage curve for each damage area.
- **Step 5** – Perform risk analysis in HEC-FDA for each damage area.

This section describes Steps 1 through 3 in detail.

3.7.1 Inventory Development Overview

Developing the structure inventory for the CVFPP damage areas in the Sacramento and San Joaquin river basins was a major activity of the economic flood damage analysis. The 2010 June parcel data compiled by ParcelQuest[5] were used as the basis for developing the structure inventory needed to complete the structure economic flood damage analysis. Reconnaissance-level field surveys were conducted to obtain the following information to support development of structure values and subsequent economic flood damage analyses in HEC-FDA:

[5] ParcelQuest is a company that operates in the State of California and provides parcel and map data in digital format.

- **Structure categories** – Public, industrial, commercial, urban[6] residential, and rural residential

- **Occupancy type** – A subcategory of the structure category with additional landuse information (see Tables 3-2 and 3-3)

- **Number of buildings** and corresponding **number of stories** (with or without a basement) in a parcel

- **Number of units per residential parcel**

- **Construction class for a building** – Class A for a steel-reinforced frame, B for a reinforced-concrete frame, C for a masonry or concrete frame, D for a wood frame, and S for a metal frame per the Marshall Valuation Service construction indicators for each occupancy type (M&S, 2010)

- **Construction quality for the building** – "Cheap/minimal, " "low cost," "average," "good," and "excellent" per descriptions in the Marshall Valuation Service (M&S, 2010)

- **Depreciation percentage** – Loss in value compared to its new-cost estimate because of (1) physical depreciation, (2) functional/technical obsolescence, and (3) external, locational, or economic obsolescence per guidance from the Marshall Valuation Service (M&S, 2010)

- **Foundation height** – Estimated difference between the average ground elevation of a parcel and the first floor of a structure, as observed from the survey, representing the first point where water could enter and damage the contents of the structure

Under the attribute "County Use" in the ParcelQuest data is a code that varies by county, but which represents the landuse condition of a parcel. For each parcel, this "County Use" code was matched to one of five structure categories (commercial, industrial, public, urban residential, and rural residential) and an occupancy type from Table 3-3 was then assigned in accordance with the landuse description provided by the specific county. Appendix A summarizes lookup tables for counties that match the "County Use" code to structure category and occupancy types of Table 3-2. Table 3-3 is an example excerpt from the lookup table for Butte County.

[6] Urban area definition is from the ESRI dataset dated on January 2010. These data were originally extracted from the U.S. Bureau of the Census TIGER/Line 2000 database.

3.7.2 Field Survey

Reconnaissance-level field structure inventory surveys were conducted in 14 counties of the Central Valley from August through early October 2010 and in April 2011 (see Table 3-4). The field surveys collected data to support the development of structure values and subsequent economic flood damage analyses in HEC-FDA. All counties inside the HEC-FDA damage areas were surveyed.

The goals of the survey were as follows:

- Determine/verify the percentage of empty parcels
- Determine structure characteristics (e.g., foundation height and depreciation percentage)
- Verify structure characteristics (e.g., building class, quality class, occupancy types, number of stories)

For each county, random parcel samples were selected from the ParcelQuest database, as follows:

- **Step 1** – Identify parcels inside the CVFPP HEC-FDA damage areas.
- **Step 2** – Assign a random number to all parcels from Step 1.
- **Step 3** – Identify parcels with land uses that belong to the five structure categories from Table 3-2.
- **Step 4** – Sort the parcels based on the five survey categories.
- **Step 5** – For each structure category, rank the parcels in ascending order based on the random number assigned in Step 2.
- **Step 6** – For each survey category, assign a survey number from 1 to 30 to the first 30 parcels. These 30 samples are used provide statistical information on the empty parcel rate and structure characteristics if a building(s) exists on a parcel.
- **Step 7** – Assign a survey number to the parcel next in the sorted list until there are 30 parcels with structures (based on aerial photos). Samples with a survey number greater than 30 provide statistical information on structure characteristics (e.g., foundation height, depreciation percentage, quality class).

Table 3-2. Structure Category and Corresponding Occupancy Type as Defined by CVFPP

Structure Category	Occupancy Type	Occupancy Type Description
Commercial	C-RET	Retail
	C-DEAL	Full-Service Auto Dealership
	C-FURN	Furniture Store
	C-HOS	Hospital
	C-AUTO	Auto Sales
	C-HOTEL	Hotel
	C-FOOD	Food-Retail
	C-RESTFF	Fast Food Restaurant
	C-GROC	Grocery Store
	C-MED	Medical
	C-OFF	Office
	C-SHOP	Shopping Center
	C-REST	Restaurants
	C-SERV	Auto Service
	ELDER	Eldercare
	MISC-COM	Miscellaneous Commercial
Industrial	I-LT	Light Industrial
	I-HV	Heavy Manufacturer
	I-WH	Warehouse
	MISC-IND	Miscellaneous Industrial
Public	P-CH	Church
	P-GOV	Government Building (including police stations, airports, ports, jails, judicial buildings)
	P-REC	Recreation/Assembly
	P-SCH	Schools
	FIRE	Fire Station
	MISC-PUB	Miscellaneous Public
Urban Residential	SFR	Single-Family Residential
	MISC-RES	Miscellaneous Residential
	MFR	Multifamily Residential
	MH	Mobile Home
	FARM	Farm Buildings, Including Primary Residential
	MISC-FARM	Miscellaneous Farm

Table 3-2. Structure Category and Corresponding Occupancy Type as Defined by CVFPP (contd.)

Structure Category	Occupancy Type	Occupancy Type Description
Rural Residential	SFR	Single-Family Residential
	MISC-RES	Miscellaneous Residential
	MFR	Multifamily Residential
	MH	Mobile Home Single/Double
	FARM	Farm Buildings, including Primary Residential
	MISC-FARM	Miscellaneous Farm
Occupancy Type Not Surveyed	CROP	Crops
	MISC-AG	Miscellaneous Agriculture
	MISC	Miscellaneous

Key:
CVFPP = Central Valley Flood Protection Plan

The structure inventory applied to the Sacramento River Basin HEC-FDA is provided in Table 3-5, the San Joaquin River Basin HEC-FDA in Table 3-6, and the Stockton area in Table 3-7. In the Sacramento River Basin, SAC63 (Sacramento South) has the greatest total number of structures (121,733), as well as for all structure categories. For SAC25 (Yuba City) and SAC36 (Natomas) total buildings total more than 20,000. In the San Joaquin River Basin, SJ34 (French Camp) has the greatest number of total structures (6,161), followed by SJ33 (Lathrop) and SJ25 (Modesto) with 5,106 and 3,011 buildings total, respectively. For the Stockton area, the total number of buildings is 65,281; the majority of the structures are in STK10, STK07, and STK08.

Because each parcel needs to have a value for all required structure information, @RISK (an add-in to Microsoft Excel from Palisade Corporation that performs risk analysis using Monte Carlo simulation) was used. The statistical distributions (e.g., normal, uniform) from survey results and parcel records were developed and missing parcel values were then populated using the @RISK software application as described below.

Table 3-3. Example Excerpt of Butte County "County Use" Code Lookup Table

County Use	Description	Structure Category	Occupancy Type	Occupancy Description
AY	Mixed Agricultural	CROP	CROP	Crops
AZ	Miscellaneous	CROP	CROP	Crops
CC	Service (garage, shop, mini-mart)	COM	C-SERV	Commercial Service-Auto
CI	Institutional (church, hospital)	COM	C-HOS	Hospital
CP	Commercial/Professional (bank, etc.)	COM	C-RET	Commercial Retail
CR	Residential (motel, hotel, mobile home park)	COM	C-HOTEL	Hotel
CS	Commercial Retail (stores, etc.)	COM	C-RET	Commercial Retail
CT	Recreational (theatre, golf, etc.)	PUB	P-REC	Public Recreation/Assembly
CU	Utilities	PUB	P-GOV	Public Government Building
CZ	Miscellaneous Commercial	COM	MISC-COM	Miscellaneous Commercial
IM	Manufacturing	IND	I-HV	Industrial Heavy Manufacture
IW	Warehouse/Wholesale Operations	IND	I-WH	Industrial Warehouse
IZ	Miscellaneous Industrial	IND	MISC-IND	Miscellaneous Industrial
R2	Duplex	RES	MFR	Multifamily Residential
R3	Triplex	RES	MFR	Multifamily Residential
R4	Fourplex	RES	MFR	Multifamily Residential
R7	Multiple Residential, not matching	RES	MFR	Multifamily Residential
RA	Five or more units – apartments	RES	MFR	Multifamily Residential

Source: Cowdin pers. Comm., 2010.
Key:
COM = Commercial
IND = Industrial
PUB = Public
RES = Residential

Table 3-4. Counties Where Structure Field Surveys Were Conducted

Sacramento River Basin	San Joaquin River Basin
Butte	Fresno
Colusa	Madera
Glenn	Merced
Sacramento	San Joaquin
Solano	Stanislaus
Sutter	
Tehama	
Yolo	
Yuba	

3.7.3 Populating Missing Parcel Data

For some parcels, structure information from ParcelQuest was incomplete; the missing data include the following:

- Building area
- Structure class
- Structure quality class
- Number of stories
- Depreciation percentage
- Foundation height

Building Area

- **Step 1** – Sort the parcel data in descending order based on building area records from ParcelQuest.

- **Step 2** – For records with values larger than zero (excluding the top and bottom 5 percent samples), identify the best-fit distribution using @RISK software based on Chi-squared statistics (between normal and log-normal).

- **Step 3** – Populate building area values based on the identified distribution for parcels with zero value from the records. Discount the populated areas based on the vacancy rate identified from the first 30 survey samples.

- **Step 4** – Rank the parcels with zero building area in an ascending order based on the random number originally used to select the parcels for field survey.

Table 3-5. Structure Inventory for Sacramento River Basin

Damage Area	Description	COM	IND	PUB	RES	Total
SAC01	Woodson Bridge East	9	3	0	120	132
SAC02	Woodson Bridge West	2	1	0	57	60
SAC03	Hamilton City	28	0	10	564	602
SAC04	Capay	1	1	4	18	24
SAC05	Butte Basin	6	3	49	213	271
SAC06	Butte City	8	1	0	37	46
SAC07	Colusa Basin North	22	6	129	510	667
SAC08	Colusa	187	8	75	1,768	2,038
SAC09	Colusa Basin South	20	29	73	381	503
SAC10	Grimes	8	0	10	91	109
SAC11	RD 1500 West	2	8	22	58	90
SAC12	Sycamore Slough	0	0	0	1	1
SAC13	Knight's Landing	32	5	8	276	321
SAC14	Ridge Cut (North)	0	0	1	1	2
SAC15	Ridge Cut (South)	0	0	0	5	5
SAC16	RD 2035	2	5	6	38	51
SAC17	East of Davis	8	5	15	706	734
SAC18	Upper Honcut	10	1	0	167	178
SAC20	Gridley	194	22	3	2,295	2,514
SAC21	Sutter Buttes East	26	19	43	1,334	1,422
SAC22	Live Oak	57	8	82	2,082	2,229
SAC23	Lower Honcut	3	15	37	403	458
SAC24	Levee Dist. No.1	26	19	77	1,316	1,438
SAC25	Yuba City	830	312	288	19,073	20,503
SAC26	Marysville	326	56	439	3,257	4,078
SAC27	Linda-Olivehurst	176	76	269	8,303	8,824
SAC28	RD 784	28	7	86	2,565	2,686
SAC29	Best Slough	2	2	17	92	113
SAC30	RD 1001	13	7	36	260	316
SAC32	RD 70-1660	0	5	27	102	134
SAC33	Meridian	6	4	8	110	128
SAC34	RD 1500 East	6	7	16	77	106
SAC35	Elkhorn	2	0	5	23	30
SAC36	Natomas	405	194	935	24,612	26,146
SAC37	Rio Linda	60	108	370	6,753	7,291
SAC38	West Sacramento	524	476	84	6,128	7,212
SAC39	RD 900	45	54	35	7,258	7,392

Table 3-5. Structure Inventory for Sacramento River Basin (contd.)

Damage Area	Description	COM	IND	PUB	RES	Total
SAC40	Sacramento North	966	300	609	12,705	14,580
SAC41	RD 302	0	0	2	26	28
SAC42	RD 999	2	4	2	102	110
SAC43	Clarksburg	22	6	3	130	161
SAC44	Stone Lake	102	14	480	15,686	16,282
SAC45	Hood	5	8	15	76	104
SAC46	Merritt Island	0	0	0	33	33
SAC47	RD 551	0	3	11	50	64
SAC48	Courtland	11	4	17	78	110
SAC49	Sutter Island	0	0	2	9	11
SAC50	Grand Island	11	2	27	312	352
SAC51	Locke	20	3	26	40	89
SAC52	Walnut Grove	44	9	28	131	212
SAC53	Tyler Island	2	5	4	3	14
SAC54	Andrus Island	73	20	117	482	692
SAC55	Ryer Island	0	0	2	90	92
SAC56	Prospect Island	0	0	4	0	4
SAC57	Twitchell Island	0	0	17	3	20
SAC58	Sherman Island	1	0	70	41	112
SAC59	Moore	0	0	1	58	59
SAC60	Cache Slough	0	3	2	58	63
SAC61	Hastings	0	0	0	11	11
SAC62	Lindsey Slough	8	10	13	2,868	2,899
SAC63	Sacramento South	3,953	1,542	3,554	112,684	121,733
Total		**8,294**	**3,400**	**8,265**	**236,730**	**256,689**

Key:
COM = commercial
IND = industrial
PUB = public
RD = reclamation district
RES = residential

Table 3-6. Structure Inventory for San Joaquin River Basin

Damage Area	Description	COM	IND	PUB	RES	Total
SJ01	Fresno	21	8	9	323	361
SJ02	Fresno Slough East	0	1	6	100	107
SJ03	Fresno Slough West	2	0	0	40	42
SJ04	Mendota	7	4	3	318	332
SJ05	Chowchilla Bypass	0	0	0	66	66
SJ06	Lone Willow Slough	0	0	0	194	194
SJ07	Mendota North	0	0	0	6	6
SJ08	Firebaugh	119	19	14	1,172	1,324
SJ09	Salt Slough	39	20	364	1,795	2,218
SJ10	Dos Palos	113	11	104	1,811	2,039
SJ11	Fresno River	0	0	0	10	10
SJ12	Berenda Slough	1	3	0	203	207
SJ13	Ash Slough	1	3	0	104	108
SJ14	Sandy Mush	0	0	13	28	41
SJ15	Turner Island	0	0	0	50	50
SJ16	Bear Creek	1	3	12	89	105
SJ17	Deep Slough	0	0	10	14	24
SJ18	West Bear Creek	0	0	76	0	76
SJ19	Fremont Ford	1	16	16	314	347
SJ20	Merced River	0	11	15	208	234
SJ21	Merced River North	1	20	20	398	439
SJ22	Orestimba	4	1	24	377	406
SJ23	Tuolumne South	0	0	16	87	103
SJ24	Tuolumne River	12	1	9	731	753
SJ25	Modesto	96	71	126	2,718	3,011
SJ26	Three Amigos	3	0	12	44	59
SJ27	Stanislaus South	0	0	31	71	102
SJ28	Stanislaus North	7	4	72	942	1,025
SJ29	Banta Carbona	1	4	16	435	456
SJ30	Paradise Cut	3	6	12	186	207
SJ31	Stewart Tract	3	1	7	6	17
SJ32	East Lathrop	16	78	13	64	171
SJ33	Lathrop/Sharpe	55	72	141	4,838	5,106
SJ34	French Camp	29	47	49	6,036	6,161
SJ35	Moss Tract	27	85	27	2,695	2,834
SJ36	Roberts Island	0	1	13	143	157
SJ37	Rough and Ready Island	0	3	5	0	8

Table 3-6. Structure Inventory for San Joaquin River Basin (contd.)

Damage Area	Description	COM	IND	PUB	RES	Total
SJ38	Drexler Tract	2	1	2	20	25
SJ39	Union Island	0	2	4	54	60
SJ40	Union Island Toe	0	0	0	8	8
SJ41	Fabian Tract	2	0	6	20	28
SJ42	RD 1007	33	18	54	265	370
SJ43	Grayson	2	0	6	235	243
Total		**601**	**514**	**1307**	**27,218**	**29,640**

Key:
COM = commercial
IND = industrial
PUB = public
RD = reclamation district
RES = residential

Table 3-7. Structure Inventory for Stockton Area

Damage Area	Description	COM	IND	PUB	RES	Total
STK01	Lower Roberts Island	0	1	21	32	54
STK06	Stockton East	19	69	18	95	201
STK07	Calaveras River	729	14	259	13,406	14,408
STK08	Bear Creek South	63	10	139	10,055	10,267
STK09	Bear Creek North	39	14	220	5,097	5,370
STK10	Central Stockton	1,694	968	853	31,466	34,981
Total		**2,544**	**1,076**	**1,510**	**60,151**	**65,281**

Key:
COM = commercial
IND = industrial
PUB = public
RES = residential

- **Step 5** – Assign the discounted populated areas to these parcels.

- **Step 6** – For nonresidential parcels, discount building area to two stories if the building is three stories or taller (e.g., multiplying a factor of two-thirds for a three-story building) because depth-damage functions for two stories were applied to these buildings.

Structure Class

In the ParcelQuest database, some parcels had an entry for structure class; however, for most of the counties, such entries do not match the definitions from Marshall & Swift. Also, some of the parcels did not have an entry for building class. For each county, @RISK was used to populate all parcels that had invalid and missing structure class entries, as follows:

- **Step 1** – Add or modify the structure class entry for parcels where the survey was conducted.

- **Step 2** – Use survey results and valid ParcelQuest records (i.e., entries consistent with Marshall & Swift) to identify the distribution.

- **Step 3** – Use @RISK software to populate discrete entries for parcels without a structure class (based on the random number, originally used to select the parcels for field survey, in an ascending order). The discrete probability is based on a normal distribution.[7]

- **Step 4** – Rank the parcels with no structure class entry in ascending order based on the random number originally used to select the parcels for field survey.

- **Step 5** – Assign the populated structure class to these parcels.

Structure Quality Class

In the ParcelQuest database, some parcels had an entry for the structure quality class in numerical values (from zero to 10) that did not match definitions from Marshall & Swift. Also, some of the parcels did not have an entry for structure quality class. For each county, @RISK was used to populate parcels that were missing structure quality class entries, as follows:

- **Step 1** – For surveyed parcels with a ParcelQuest entry for structure quality class, correlate the structure quality in the Marshall & Swift scale to the ParcelQuest numerical entry (e.g., for Butte County, "cheap/minimal" for zero through 2, "low cost" for 2.5 through 3.5, "average" for 4 through 7.5, "good" for 8 through 9, and "excellent" for 9.5 and 10).

- **Step 2** – For parcels with a numerical entry for structure quality class, identify the corresponding Marshall & Swift quality.

- **Step 3** – Use the survey results and the translated Marshall & Swift quality to identify the distribution.

- **Step 4** – Use @RISK software to populate discrete entries for parcels without a quality class (based on the random number, originally used to select the parcels for field survey, in an ascending order). The discrete probability is based on a normal distribution.

[7] All mobile homes were assigned a "D" building class to accurately reflect mobile home construction.

- **Step 5** – Rank the parcels without a quality entry in an ascending order based on the random number originally used to select the parcels for field survey.

- **Step 6** – Assign the populated structure quality class to these parcels.

Number of Stories

In the ParcelQuest database, some of the parcels do not have an entry for the number of stories. For each county, @RISK was used to populate the parcels that were missing number of stories data, as follows:

- **Step 1** – Add or modify the number of stories entries for parcels where the survey was conducted.

- **Step 2** – Use the survey results and available ParcelQuest records to identify the distribution.

- **Step 3** – Use @RISK software to populate discrete entries for parcels without the stories class (based on the random number in an ascending order). The discrete probability is based on a normal distribution.

- **Step 4** – Rank the parcels without the number of stories entry in an ascending order based on the random number, originally used to select the parcels for field survey.

- **Step 5** – Assign the populated number of stories to these parcels.

Depreciation Percentage

In the ParcelQuest database, no parcels have an attribute for depreciation. For each county, @RISK was used to populate the depreciation attribute for parcels for which no survey was conducted as follows:

- **Step 1** – Add depreciation entry for parcels for which a survey was conducted.

- **Step 2** – Use survey values to identify the distribution with an increment of 5 percent.

- **Step 3** – Use @RISK software to populate discrete entries for parcels without depreciation (based on the random number, originally used to select the parcels for field survey, in an ascending order). The discrete probability is based on a normal distribution.

- **Step 4** – Rank parcels without a depreciation entry in an ascending order based on the random number originally used to select the parcels for field survey.

- **Step 5** – Assign the populated depreciation to these parcels.

Foundation Height

In the ParcelQuest database, there is no attribute for foundation height for all parcels. For each county, @RISK was used to populate the foundation height for parcels for which no survey was conducted as follows:

- **Step 1** – Add a foundation height entry for parcels for which a survey was conducted.

- **Step 2** – Use the survey values to identify the distribution with an increment of 0.5 feet.

- **Step 3** – Use @RISK software to populate discrete entries for parcels without a foundation height (based on the random number, originally used to select the parcels for field survey, in an ascending order). The discrete probability is based on a normal distribution.

- **Step 4** – Rank parcels without a foundation height entry in an ascending order based on the random number originally used to select the parcels for field survey.

- **Step 5** – Assign the populated foundation height to these parcels.

3.7.4 Building Cost per Square Foot

For the CVFPP economic evaluation, the cost per square foot of a new building was identified based on a combination of its occupancy type, construction class, and structure quality, and the October 2010 price level of the cost per square foot. This price level was developed from the third quarter, October 2010, edition of Marshall & Swift and was adjusted based on the current cost multiplier and local multiplier.[8] Appendix B documents the costs per square foot for all buildings applicable to the CVFPP analysis. Table 3-8 is an excerpt of the M&S table for the commercial retail occupancy type.

[8] Aggregate California local multiplier was used to bring prices to October 2010 levels in all impact areas because Marshall Valuation Service does not provide local multipliers for every locality within the CVFPP planning areas.

Table 3-8. Excerpt of Marshall & Swift Table for Commercial Retail Occupancy Type – Building Cost per Square Foot

Structure Class	Construction Quality				
	Excellent	Good	Average	Low Cost	Cheap/ Minimal
A	$147.44	$110.63	$87.06	$66.18	N/A
B	$144.68	$107.96	$84.60	$63.97	N/A
C	$122.02	$90.08	$68.44	$49.27	N/A
D	$118.63	$87.07	$65.84	$47.07	N/A
S	N/A	$85.05	$63.15	$44.22	N/A

Sources: M&S 2010a
Note: Expiration Date: April 2010
Key: N/A = not available

Since @Risk was used to populate data not available from the original ParcelQuest database, a combination of populated features might result in a structure that cannot be identified by Marshall & Swift. In such cases, unit cost for structures with features closest to the combination was used to represent the unit cost. For example, if populating data with @Risk resulted in an auto facility (commercial category) of Class A in construction and low cost in construction quality, such a structure cannot be identified in the Marshall Valuation Service. Therefore, the unit cost for an auto facility of Class A in construction and average in construction quality was used (Table 3-9) to represent an auto facility of Class A in construction and low cost in construction quality.

For each of the five structure categories, the cost-per-square-foot values for miscellaneous buildings were determined by taking the average cost per square foot of their respective categories in the entire river basin. For example, the cost per square foot for miscellaneous commercial buildings in Sacramento County was determined by taking the average cost per square foot of all commercial buildings in the Sacramento River Basin.

3.7.5 Estimate of Structure and Contents Value

After identifying the cost per square foot for new construction, the structure value was estimated by multiplying the per-square-foot cost by the total square footage of the building. The depreciated replacement value was calculated by deducting the depreciation percentage from the structure value as new.

The contents value inside of the structure was estimated in HEC-FDA as a function of the structure value, by multiplying the depreciated replacement value by the contents-to-structure ratio. These ratios were from the

USACE *American River Watershed Project, Folsom Dam Modifications and Folsom Dam Raise Project Final Economic Reevaluation Report* (USACE, 2008b). Because of the nature of the building usage, this contents-to-structure ratio varies with occupancy type, as shown in Table 3-10.

Table 3-9. Modified Cost per Square Foot for Commercial Auto Facility

Structure Class	Construction Quality				
	Excellent	Good	Average	Low Cost	Cheap/ Minimal
A	N/A	N/A	$70.38	$70.38*	N/A
B	N/A	N/A	$70.38	N/A	N/A
C	$92.93	$65.37	$47.31	$34.42	N/A
D	N/A	$56.85	$41.65	$30.68	N/A
S	N/A	$55.47	$40.10	$29.15	N/A

Sources: M&S 2010a
Notes:
* Number for Class A and average construction quality was used to represent this category because a structure of this category cannot be identified in Marshall Valuation Service. Expiration Date: January 2012
Key:
N/A = Not available

The structure and contents values of buildings in the Sacramento River Basin are shown in Tables 3-11 and 3-12, respectively. In the Sacramento River Basin, SAC63 (Sacramento South) has the highest structure values ($15.1 billion) and contents values ($7.7 billion), followed by SAC36 (Natomas) and SAC25 (Yuba City). Total structure and contents values in the Sacramento River Basin are $33.2 billion and $17.2 billion, respectively.

The structure and contents values of structures in the San Joaquin River Basin are shown in Tables 3-13 and 3-14, respectively. In the San Joaquin River Basin, SJ34 (French Camp) has the highest structure values ($778 million) and contents values ($395 million), followed by SJ33 (Lathrop/Sharpe) with $667 million in structure values and $341 million in contents values. Total structure and contents values in the San Joaquin River Basin are $2.9 billion and $1.6 billion, respectively.

The structure and contents values of structures in the Stockton area are included in Tables 3-13 and 3-14, respectively. In the Stockton area, STK10 has the highest structure values ($3.1 billion) and contents values ($1.6 billion). Total structure and contents values in the Stockton area are $7.0 billion and $3.6 billion, respectively.

3.7.6 Structure and Contents Damage Function

To determine structure and contents damages under different flood depths, HEC-FDA selects a damage function based on the number of stories and occupancy type of a building. The damage percent is then identified based on the water depth above the foundation of the building (positive represents a water depth higher than the foundation and vice versa). Figure 3-9 is an example of the structure damage functions for a one-story public recreational building; the greater the water depth, the larger the percent of structure damage. The contents value of the building is calculated in a similar manner, but the damage function is used for structure contents. Appendix C documents the structure damage functions, as well as contents damage functions, for this CVFPP economic flood damage analysis. These damage functions are from the USACE *American River Watershed Project, Folsom Dam Modifications and Folsom Dam Raise Project Final Economic Reevaluation Report* (USACE, 2008b).

Table 3-10. Contents-to-Structure Ratio

Occupancy Type	Description	Ratio	Occupancy Type	Description	Ratio
C-RET1	Retail – one-story	51%	I-LT1	Light industrial – one-story	188%
C-RET2	Retail – two-story	47%	I-LT2	Light industrial – two-story	126%
C-DEAL1	Full service auto dealership - one-story	69%	I-HV1	Heavy manufacturer – one-story	31%
C-DEAL2	Full service auto dealership - two-story	69%	I-HV2	Heavy manufacturer – two-story	20%
C-FURN1	Furniture store – one-story	55%	I-WH1	Warehouse – one-story	89%
C-FURN2	Furniture store – two-story	36%	I-WH2	Warehouse – two-story	85%
C-HOS1	Hospital – one-story	92%	P-CH1	Church – one-story	20%
C-HOS2	Hospital – two-story	87%	P-CH2	Church – two-story	17%
C-AUTO1	Auto sales – one-story	62%	P-GOV1	Government building – one-story	35%
C-AUTO2	Auto sales – two-story	62%	P-GOV2	Government building – two-story	26%
C-HOTEL1	Hotel – one-story	69%	P-REC1	Recreation/assembly – one-story	132%
C-HOTEL2	Hotel – two-story	69%	P-REC2	Recreation/assembly – two-story	58%
C-FOOD1	Food-retail – one-story	42%	P-SCH1	School – one-story	38%
C-FOOD2	Food-retail – two-story	43%	P-SCH2	School – two-story	32%
C-RESTFF1	Fast food restaurant – one-story	42%	SFRB1	Single-family – one-story with basement	50%
C-RESTFF2	Fast food restaurant – two-story	42%	SFRB2	Single-family – two-story with basement	50%
C-GROC1	Grocery store – one-story	106%	SFRBS	Single-family split with basement	50%
C-GROC2	Grocery store – two-story	106%	SFR1	Single-family – one-story	50%
C-MED1	Medical – one-story	148%	SFR2	Single-family – two-story	50%
C-MED2	Medical – two-story	121%	SFRS	Single-family split	50%
C-OFF1	Office – one-story	34%	MFR1	Multi-family – one-story	50%
C-OFF2	Office – two-story	28%	MFR2	Multi-family – two-story	50%
C-SHOP1	Shopping center – one-story	67%	MH	Mobile Home	50%
C-SHOP2	Shopping center – two-story	54%	MISC-COM1	Miscellaneous commercial – one-story	*
C-REST1	Restaurant – one-story	134%	MISC-COM2	Miscellaneous commercial – two-story	*
C-REST2	Restaurant – two-story	118%	MISC-IND1	Miscellaneous industrial – one-Story	*

Table 3-10. Contents-to-Structure Ratio (contd.)

Occupancy Type	Description	Ratio	Occupancy Type	Description	Ratio
C-SERV1	Auto service – one-story	193%	MISC-IND2	Miscellaneous industrial – two-story	*
C-SERV2	Auto service – two-story	193%	MISC-PUB1	Miscellaneous public – one-story	*
ELDER1*	Miscellaneous commercial – one-story	*	MISC-PUB2	Miscellaneous public – two-story	*
ELDER2*	Miscellaneous commercial two-story	*	MISC-RES1	Miscellaneous residential – one-story	*
FIRE1	Government building – one-story	35%	MISC-RES2	Miscellaneous residential – two-story	*
FIRE2	Government building – two-story	26%			

Note:
*Structure and contents values for miscellaneous categories are calculated based on the distribution of occupancy types and therefore vary between each damage area.

Table 3-11. Structure Depreciated Replacement Values in 2010 October $1,000 – Sacramento River Basin

Damage Area	Description	Commercial	Industrial	Public	Residential	Total
SAC01	Woodson Bridge East	788	583	0	10,328	11,699
SAC02	Woodson Bridge West	616	157	0	4,089	4,862
SAC03	Hamilton City	6,757	0	4,033	33,539	44,330
SAC04	Capay	602	1,604	5,971	1,406	9,582
SAC05	Butte Basin	377	2,878	5,952	21,713	30,920
SAC06	Butte City	1,135	25	0	1,857	3,017
SAC07	Colusa Basin North	8,373	1,399	15,649	51,392	76,814
SAC08	Colusa	41,522	1,780	10,174	143,530	197,006
SAC09	Colusa Basin South	3,802	7,110	10,556	39,095	60,563
SAC10	Grimes	1,117	0	983	6,723	8,823
SAC11	RD 1500 West	1,259	654	4,090	7,118	13,120
SAC12	Sycamore Slough	0	0	0	131	131
SAC13	Knight's Landing	10,215	5,316	1,596	36,091	53,219
SAC14	Ridge Cut (North)	0	0	30	138	169
SAC15	Ridge Cut (South)	0	0	0	1,020	1,020
SAC16	RD 2035	315	14,691	1,139	7,077	23,222
SAC17	East of Davis	944	3,070	3,403	187,435	194,852
SAC18	Upper Honcut	1,302	55	0	11,908	13,265
SAC20	Gridley	51,396	12,784	546	188,162	252,889
SAC21	Sutter Buttes East	9,172	32,208	11,964	137,974	191,318
SAC22	Live Oak	11,916	4,882	23,333	188,644	228,775
SAC23	Lower Honcut	104	3,319	2,432	41,692	47,546
SAC24	Levee District No.1	8,011	2,286	21,322	162,809	194,429
SAC25	Yuba City	384,626	89,143	108,676	2,062,691	2,645,136
SAC26	Marysville	58,704	18,512	32,344	280,785	390,345
SAC27	Linda-Olivehurst	88,435	21,974	15,834	670,612	796,855
SAC28	RD 784	2,460	344	5,128	312,281	320,214
SAC29	Best Slough	161	36	924	13,005	14,126
SAC30	RD 1001	1,037	1,387	13,072	28,272	43,768
SAC32	RD 70-1660	0	808	4,452	11,377	16,637
SAC33	Meridian	594	681	881	8,397	10,552
SAC34	RD 1500 East	1,599	1,849	6,054	7,272	16,773
SAC35	Elkhorn	414	0	655	3,857	4,926
SAC36	Natomas	166,186	84,924	752,590	2,628,562	3,632,262
SAC37	Rio Linda	19,253	58,460	347,938	519,191	944,843
SAC38	West Sacramento	281,448	432,103	17,229	523,871	1,254,650

Table 3-11. Structure Depreciated Replacement Values in 2010 October $1,000 – Sacramento River Basin (contd.)

Damage Area	Description	Commercial	Industrial	Public	Residential	Total
SAC39	RD 900	17,667	53,677	7,721	1,062,248	1,141,313
SAC40	Sacramento North	377,472	161,251	608,956	1,258,308	2,405,988
SAC41	RD 302	0	0	598	3,272	3,870
SAC42	RD 999	1,821	2,755	192	15,408	20,176
SAC43	Clarksburg	6,928	2,770	527	20,545	30,770
SAC44	Stone Lake	31,858	5,271	331,873	1,707,428	2,076,430
SAC45	Hood	963	4,545	14,635	4,814	24,957
SAC46	Merritt Island	0	0	0	5,426	5,426
SAC47	RD 551	0	4,637	7,721	5,697	18,055
SAC48	Courtland	2,055	1,619	10,496	5,657	19,828
SAC49	Sutter Island	0	0	1,831	1,110	2,941
SAC50	Grand Island	3,396	362	12,826	31,795	48,378
SAC51	Locke	7,550	768	32,644	3,160	44,123
SAC52	Walnut Grove	14,123	6,566	34,266	8,897	63,853
SAC53	Tyler Island	436	2,583	1,162	376	4,557
SAC54	Andrus Island	26,197	6,790	82,877	32,346	148,209
SAC55	Ryer Island	0	0	73	5,013	5,086
SAC56	Prospect Island	0	0	253	0	253
SAC57	Twitchell Island	0	0	13,479	375	13,854
SAC58	Sherman Island	343	0	49,147	3,100	52,589
SAC59	Moore	0	0	4	3,258	3,262
SAC60	Cache Slough	0	1,025	99	3,203	4,327
SAC61	Hastings	0	0	0	578	578
SAC62	Lindsey Slough	3,806	9,487	956	166,792	181,040
SAC63	Sacramento South	1,502,804	792,463	3,398,289	9,431,240	15,124,796
Grand Total		**Commercial**	**Industrial**	**Public**	**Residential**	**Total**
		3,162,059	**1,861,594**	**6,039,573**	**22,134,088**	**33,197,315**

Key:
RD = Reclamation District

Table 3-12. Building Contents Costs in 2010 October $1,000 – Sacramento River Basin

Damage Area	Description	Commercial	Industrial	Public	Residential	Total
SAC01	Woodson Bridge East	535	221	0	5,164	5,920
SAC02	Woodson Bridge West	334	295	0	2,045	2,674
SAC03	Hamilton City	4,262	0	1,550	16,769	22,582
SAC04	Capay	309	1,196	2,295	703	4,503
SAC05	Butte Basin	257	710	2,599	10,856	14,423
SAC06	Butte City	764	22	0	929	1,715
SAC07	Colusa Basin North	4,813	2,536	7,386	25,696	40,430
SAC08	Colusa	25,535	3,124	3,203	71,765	103,627
SAC09	Colusa Basin South	2,224	10,751	4,350	19,547	36,872
SAC10	Grimes	835	0	323	3,361	4,519
SAC11	RD 1500 West	647	715	1,360	3,559	6,281
SAC12	Sycamore Slough	0	0	0	65	65
SAC13	Knight's Landing	8,010	5,547	1,082	18,046	32,685
SAC14	Ridge Cut (North)	0	0	40	69	109
SAC15	Ridge Cut (South)	0	0	0	510	510
SAC16	RD 2035	107	13,200	638	3,539	17,483
SAC17	East of Davis	1,059	5,713	1,715	93,718	102,205
SAC18	Upper Honcut	1,240	17	0	5,954	7,211
SAC20	Gridley	46,918	7,526	510	94,081	149,035
SAC21	Sutter Buttes East	6,422	11,927	4,617	68,987	91,953
SAC22	Live Oak	6,847	4,176	7,497	94,322	112,842
SAC23	Lower Honcut	69	5,778	798	20,846	27,491
SAC24	Levee District No.1	4,320	1,962	7,866	81,405	95,553
SAC25	Yuba City	201,399	94,602	36,449	1,031,345	1,363,795
SAC26	Marysville	37,883	22,315	12,189	140,392	212,780
SAC27	Linda-Olivehurst	41,889	17,991	7,485	334,969	402,334
SAC28	RD 784	1,649	494	1,735	156,141	160,019
SAC29	Best Slough	70	45	542	6,503	7,159
SAC30	RD 1001	543	1,013	4,710	14,136	20,401
SAC32	RD 70-1660	0	1,177	1,552	5,689	8,418
SAC33	Meridian	625	584	484	4,198	5,892
SAC34	RD 1500 East	789	1,586	2,078	3,636	8,090
SAC35	Elkhorn	194	0	516	1,929	2,639
SAC36	Natomas	89,538	87,252	335,047	1,314,281	1,826,117
SAC37	Rio Linda	13,455	70,446	111,094	259,596	454,591
SAC38	West Sacramento	199,776	451,815	8,779	261,935	922,304

Table 3-12. Building Contents Costs in 2010 October $1,000 – Sacramento River Basin (contd.)

Damage Area	Description	Commercial	Industrial	Public	Residential	Total
SAC39	RD 900	12,533	51,074	6,481	531,124	601,212
SAC40	Sacramento North	204,151	208,392	211,411	629,154	1,253,107
SAC41	RD 302	0	0	237	1,636	1,873
SAC42	RD 999	1,099	4,828	67	7,704	13,698
SAC43	Clarksburg	4,784	2,961	256	10,272	18,274
SAC44	Stone Lake	18,076	5,496	157,399	853,714	1,034,686
SAC45	Hood	405	7,552	4,298	2,407	14,661
SAC46	Merritt Island	0	0	0	2,713	2,713
SAC47	RD 551	0	4,569	2,521	2,848	9,938
SAC48	Courtland	2,415	2,264	3,647	2,829	11,155
SAC49	Sutter Island	0	0	639	555	1,194
SAC50	Grand Island	3,038	680	3,810	15,897	23,424
SAC51	Locke	3,868	767	12,148	1,580	18,363
SAC52	Walnut Grove	7,500	7,850	13,232	4,449	33,030
SAC53	Tyler Island	214	3,213	399	188	4,014
SAC54	Andrus Island	14,316	10,876	25,387	16,173	66,752
SAC55	Ryer Island	0	0	25	2,506	2,532
SAC56	Prospect Island	0	0	88	0	88
SAC57	Twitchell Island	0	0	4,666	187	4,854
SAC58	Sherman Island	149	0	15,720	1,550	17,419
SAC59	Moore	0	0	1	1,629	1,630
SAC60	Cache Slough	0	1,924	71	1,601	3,596
SAC61	Hastings	0	0	0	289	289
SAC62	Lindsey Slough	1,897	15,765	334	83,396	101,392
SAC63	Sacramento South	848,709	1,014,337	1,122,307	4,715,620	7,700,973
Grand Total		**Commercial**	**Industrial**	**Public**	**Residential**	**Total**
		1,826,469	**2,167,284**	**2,155,632**	**11,066,707**	**17,216,093**

Note:
RD = Reclamation District

Table 3-13. Structure Depreciated Replacement Values in 2010 October $1,000 – San Joaquin River Basin and Stockton Area

Damage Area	Description	Commercial	Industrial	Public	Residential	Total
SJ01	Fresno	3,494	20,646	2,383	51,653	78,175
SJ02	Fresno Slough East	0	3,314	1,050	8,574	12,938
SJ03	Fresno Slough West	427	0	0	3,554	3,981
SJ04	Mendota	569	3,961	516	22,300	27,347
SJ05	Chowchilla Bypass	0	0	0	3,221	3,221
SJ06	Lone Willow Slough	0	0	0	10,794	10,794
SJ07	Mendota North	0	0	0	531	531
SJ08	Firebaugh	16,000	4,990	4,773	106,881	132,645
SJ09	Salt Slough	2,898	1,927	36,762	81,569	123,156
SJ10	Dos Palos	8,778	368	10,898	68,998	89,043
SJ11	Fresno River	0	0	0	506	506
SJ12	Berenda Slough	61	863	0	12,159	13,083
SJ13	Ash Slough	16	590	0	5,946	6,553
SJ14	Sandy Mush	0	0	1,216	1,117	2,333
SJ15	Turner Island	0	0	0	1,900	1,900
SJ16	Bear Creek	98	85	1,218	3,474	4,876
SJ17	Deep Slough	0	0	1,095	557	1,652
SJ18	West Bear Creek	0	0	7,871	0	7,871
SJ19	Fremont Ford	98	689	1,636	12,420	14,844
SJ20	Merced River	0	499	1,519	9,333	11,352
SJ21	Merced River North	91	3,204	1,689	35,451	40,436
SJ22	Orestimba	257	160	1,675	19,474	21,566
SJ23	Tuolumne South	0	0	723	4,887	5,610
SJ24	Tuolumne River	2,978	1,944	462	38,262	43,646
SJ25	Modesto	12,218	119,673	7,568	178,699	318,158
SJ26	Three Amigos	427	0	511	2,213	3,150
SJ27	Stanislaus South	0	0	1,688	4,759	6,446
SJ28	Stanislaus North	1,886	112	3,076	122,176	127,249
SJ29	Banta Carbona	65	158	732	19,630	20,585
SJ30	Paradise Cut	479	262	465	14,109	15,315
SJ31	Stewart Tract	648	34	305	459	1,446
SJ32	East Lathrop	2,981	2,609	468	4,159	10,217
SJ33	Lathrop/Sharpe	16,618	3,609	6,073	640,822	667,121
SJ34	French Camp	8,524	2,204	2,049	765,390	778,167
SJ35	Moss Tract	7,238	3,641	1,150	250,731	262,759
SJ36	Roberts Island	0	45	763	11,123	11,931

Table 3-13. Structure Depreciated Replacement Values in 2010 October $1,000 – San Joaquin River Basin and Stockton Area (contd.)

Damage Area	Description	Commercial	Industrial	Public	Residential	Total
SJ37	Rough and Ready Island	0	106	245	0	351
SJ38	Drexler Tract	559	34	69	1,562	2,224
SJ39	Union Island	0	86	182	2,310	2,578
SJ40	Union Island Toe	0	0	0	795	795
SJ41	Fabian Tract	516	0	210	1,340	2,066
SJ42	RD 1007	14,693	864	2,161	20,377	38,094
SJ43	Grayson	179	0	515	11,640	12,334
STK01	Lower Roberts Island	0	36	4,357	2,865	7,259
STK06	Stockton East	2,322	2,959	38,781	11,129	20,227
STK07	Calaveras River	88,182	529	38,049	1,783,018	1,909,778
STK08	Bear Creek South	6,267	457	23,003	1,146,374	1,176,100
STK09	Bear Creek North	3,594	653	37,744	757,570	799,562
STK10	Central Stockton	186,179	42,523	150,746	2,682,835	3,062,284
Grand Total:		**Commercial**	**Industrial**	**Public**	**Residential**	**Total**
		389,340	**223,834**	**396,396**	**8,939,646**	**9,914,255**

Note:
RD = Reclamation District

Table 3-14. Building Contents Costs in 2010 October $1,000 – San Joaquin River Basin and Stockton Area

Damage Area	Description	Commercial	Industrial	Public	Residential	Total
SJ01	Fresno	1,920	38,635	2,970	25,826	69,352
SJ02	Fresno Slough East	0	6,220	1,389	4,287	11,895
SJ03	Fresno Slough West	219	0	0	1,777	1,997
SJ04	Mendota	302	3,544	104	11,150	15,100
SJ05	Chowchilla Bypass	0	0	0	1,611	1,611
SJ06	Lone Willow Slough	0	0	0	5,397	5,397
SJ07	Mendota North	0	0	0	265	265
SJ08	Firebaugh	9,556	5,972	1,361	53,441	70,329
SJ09	Salt Slough	1,483	3,164	22,705	40,784	68,135
SJ10	Dos Palos	4,553	662	3,624	34,499	43,338
SJ11	Fresno River	0	0	0	253	253
SJ12	Berenda Slough	65	1,374	0	6,080	7,519
SJ13	Ash Slough	31	1,107	0	2,973	4,112
SJ14	Sandy Mush	0	0	491	559	1,050
SJ15	Turner Island	0	0	0	950	950
SJ16	Bear Creek	50	160	425	1,737	2,373
SJ17	Deep Slough	0	0	441	278	719
SJ18	West Bear Creek	0	0	2,746	0	2,746
SJ19	Fremont Ford	50	1,294	571	6,210	8,125
SJ20	Merced River	0	937	530	4,667	6,134
SJ21	Merced River North	47	2,733	576	17,725	21,081
SJ22	Orestimba	167	300	620	9,737	10,825
SJ23	Tuolumne South	0	0	328	2,443	2,771
SJ24	Tuolumne River	2,655	609	144	19,131	22,538
SJ25	Modesto	12,294	123,435	2,661	89,349	227,739
SJ26	Three Amigos	189	0	178	1,106	1,474
SJ27	Stanislaus South	0	0	589	2,379	2,968
SJ28	Stanislaus North	1,164	186	1,386	61,088	63,824
SJ29	Banta Carbona	57	267	358	9,815	10,496
SJ30	Paradise Cut	271	492	263	7,055	8,081
SJ31	Stewart Tract	596	28	135	229	989
SJ32	East Lathrop	3,658	4,348	166	2,080	10,251
SJ33	Lathrop/Sharpe	14,152	4,083	2,358	320,411	341,004
SJ34	French Camp	7,786	3,736	889	382,695	395,107
SJ35	Moss Tract	6,968	5,396	436	125,365	138,164
SJ36	Roberts Island	0	40	436	5,562	6,037
SJ37	Rough and Ready Island	0	139	81	0	220

Table 3-14. Building Contents Costs in 2010 October $1,000 – San Joaquin River Basin and Stockton Area (contd.)

Damage Area	Description	Commercial	Industrial	Public	Residential	Total
SJ38	Drexler Tract	644	30	24	781	1,479
SJ39	Union Island	0	161	67	1,155	1,382
SJ40	Union Island Toe	0	0	0	397	397
SJ41	Fabian Tract	503	0	188	670	1,360
SJ42	RD 1007	10,181	1,411	1,087	10,188	22,867
SJ43	Grayson	185	0	168	5,820	6,173
STK01	Lower Roberts Island	0	68	1,499	1,433	3,000
STK06	Stockton East	2,775	4,481	1,476	5,565	14,298
STK07	Calaveras River	39,710	518	25,034	891,509	956,771
STK08	Bear Creek South	4,898	686	11,080	573,187	589,850
STK09	Bear Creek North	2,036	870	20,758	378,785	402,447
STK10	Central Stockton	154,353	59,899	68,055	1,341,417	1,623,724
		Commercial	**Industrial**	**Public**	**Residential**	**Total**
	Grand Total	**283,516**	**276,985**	**178,397**	**4,469,821**	**5,208,718**

Note:
RD = Reclamation District

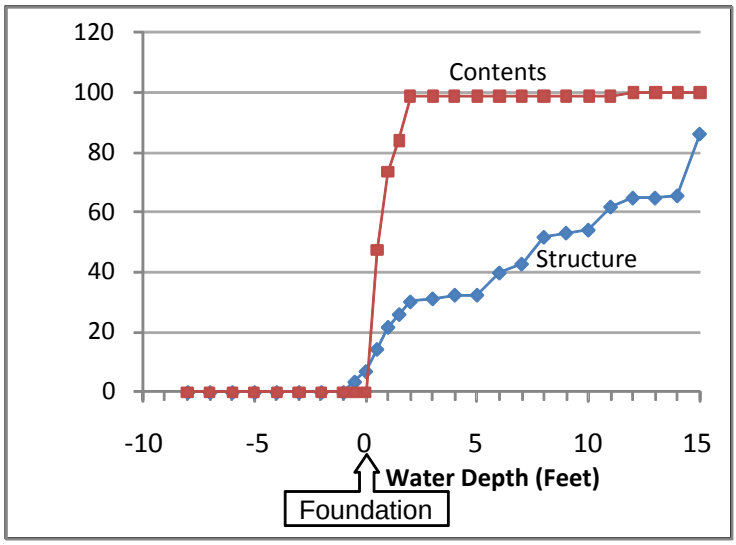

Figure 3-9. Damage Functions for Contents and Structures of One-Story Public Recreational Buildings

3.8 Crop Flood Damage Analysis

Of the total 2.2 million acres of the CVFPP HEC-FDA planning area (floodplains) in the Sacramento and San Joaquin river basins, about 1.6 million acres are irrigated crop land. Crop flood damages under the CVFPP No Project condition were evaluated using the same approach as in the Comprehensive Study (i.e., using the Comprehensive Study Agricultural Damage Spreadsheet (Ag damage spreadsheet) as the tool to estimate damage values for the Sacramento and San Joaquin river basins (USACE, 2010b)). Flood events evaluated were for AEPs of 10, 2, 1, 0.5, and 0.2 percent (i.e., 10-, 50-, 100-, 200-, and 500-year floods).

In the Comprehensive Study Ag damage spreadsheet, a table for each HEC-FDA damage area calculates crop flood damage (USACE, 2010b). The May 2010 DWR GIS landuse dataset for Central Valley landuse conditions was laid over the derived flood depth grid (the same dataset used for the structure damage analysis and derived from the Comprehensive Study flood depth grid data, as described previously) to calculate total inundated acreage for different crops under each flood event. The Comprehensive Study Ag damage spreadsheet was next used to estimate total damages for each damage area by multiplying the inundated acreages with the updated unit damage cost for each flood event. Outputs from the spreadsheet were used as input to HEC-FDA to calculate the EAD for crop damages.

For each damage area, the crop stage-damage curve for the CVFPP No Project condition was developed based on the relationship between river stage at the index point (from UNET output and applied in structure damage analysis) and total crop damage for the entire damage area under different flood events. The No Project crop stage-damage curves were applied in HEC-FDA to calculate the crop damage EAD for all CVFPP approaches based on the assumption that this interior-exterior relationship remains independent of conditions such as hydrology and levee performance.

3.8.1 Crop Types

The DWR GIS landuse dataset has a total of 204 different classes of agricultural land use, 117 of which can be found in the CVFPP HEC-FDA damage areas. These 117 classes were then categorized into eight land uses that could produce 20 different types of crops (see Table 3-15). (In the original Comprehensive Study Ag damage spreadsheet for the Sacramento and San Joaquin river basins, there were 19 predominant crop types (USACE, 2010b). For the CVFPP, citrus was added for a total of 20 crop types.) Appendix D documents the complete designation of the DWR

landuse classes to the 20 crops for the CVFPP economic flood damage analysis.

For each of the 20 crop types, there are two kinds of unit damage cost per acre: one for short-term flood duration (shorter than five days) and one for long-term flood duration (longer than five days). Weighted unit damage cost per acre was developed based on the assumed percentage of short- and long-term inundation. Flood duration assumptions were from the Comprehensive Study Ag damage spreadsheet (USACE, 2010).

3.8.2 Crop Assumptions Update

Values in the Comprehensive Study Ag damage spreadsheets were in 2001 October dollars; they were updated to present day dollars (i.e., 2010 October dollars) for the CVFPP using the price adjustment approach outlined in the DWR Flood Rapid Assessment Model (F-RAM) Development (DWR, 2008). Also, as mentioned, citrus was added to the original Comprehensive Study predominant crop list for a total of 20 crop types; thus, income and damage assumptions were developed to calculate unit damages for citrus.

Components of Crop Damage

Estimates of agricultural damages include cultivation costs (growing costs), harvest costs, establishment costs, land cleanup and rehabilitation costs, and loss of gross income:

- Cultivation costs were obtained from the University of California, Davis (UC Davis), Department of Agricultural and Resource Economics. These typically include costs such as subsoil treatment, irrigation, weed control, pest control, and fertilization, as well as other costs that are more crop-specific (UC Davis, 2010).

- Harvest/post-harvest costs were obtained from the UC Davis Department of Agricultural and Resource Economics. These include costs related to harvesting, and typically include costs such as cutting, hauling, and packing (UC Davis, 2010).

- Establishment costs were obtained from the UC Davis Department of Agriculture and Resource Economics. These are costs necessary to completely reestablish a crop that has been severely damaged (e.g., if a flood duration is longer than five days for some crops or three days for alfalfa) and must be replanted or reseeded and regrown. Establishment costs would be especially high for crops that need more than one year to mature in order to be harvested, such as orchard crops. Establishment costs typically include expenses such as land preparation, planting, production expenses, and cash overhead for

growing the crops through the first year of viable harvest (UC Davis, 2010).

- Land cleanup and rehabilitation costs are added as a fixed cost to each estimate. These costs are assumed to be the same for all crops (UC Davis, 2010).

Table 3-15. Crop Types and Unit Damage Costs for CVFPP Flood Damage Analysis

Crop Types	Products	Sacramento Valley (damage/acre in 2010 October dollars)		San Joaquin Valley (damage/acre in 2010 October dollars)	
		Short-Term[1]	Long-Term[2]	Short-Term[1]	Long-Term[2]
Citrus	Oranges	222	3,463	222	3,463
Fruit and Nuts	Almonds	1,320	4,819	1,387	4,819
	Walnuts	739	4,120	820	4,176
	Peaches	1,257	6,181	1,381	6,425
	Pears	2,514	9,777	2,619	9,917
	Prunes	594	4,819	684	4,889
Field	Cotton	497	497	654	654
	Beans	342	363	397	448
	Safflower	337	373	387	427
	Wheat	489	508	506	511
	Corn	361	361	391	391
Pasture and Alfalfa	Pasture	419	698	394	752
	Alfalfa	547	1,057	608	1,085
Rice	Rice	323	323	372	376
Truck	Melons	652	652	700	700
	Tomatoes	947	947	1,205	1,205
Vine	Wine grapes	824	6,076	905	6,285
Other	Idle	291	291	291	291
	Semi agricultural	291	291	291	291
	Native vegetation	145	145	145	145

Notes:
[1] Inundation shorter than 5 days.
[2] Inundation longer than 5 days.

Key:
CVFPP = Central Valley Flood Protection Plan

- Gross income from each crop originates from the *Agricultural Commissioner's Report for San Joaquin County* (UC Davis, 2010).

Effects of seasonality and flooding duration are considered in the computation of agricultural flood damages for each crop (DWR, 2008). Monthly data are gathered into a weighted average annual damage estimate based on income, costs, probability of flood in that month, and percent of damages that would occur if there were a flood.

Citrus Damage Cost Development

The 2001 agricultural damage estimates for all crop categories, except citrus, were obtained from the Comprehensive Study Ag damage spreadsheets (USACE, 2010b). The agricultural damage estimates for citrus crops were calculated using the approach outlined in the F-RAM Development (DWR, 2008).

Gross income for citrus crops was estimated using the income from oranges; all values used were obtained from the California Agricultural Production Statistics, provided by the California Department of Food and Agriculture (CDFA, 2009a and 2009b). The latest gross-income data available were for the 2007 to 2008 period.

Cultivation cost, harvest/post-harvest cost, and establishment costs were obtained from UC Davis (UC AIC, 2009). The latest agricultural cost data available from UC Davis was for 2009; however, the CDFA gross income data for 2009 were not available. The most recent year when both the gross income data from CDFA and agricultural cost data from UC Davis were available was 2007. These costs were updated to 2010 October dollars by the Prices Paid Multiplier, as described in the next section (CDFA, 2009a and 2009b).

Gross income was obtained by taking the rolling average of dollar value per carton from 2003 to 2007 to correct for any cyclical market highs or lows; the average was then multiplied by the number of cartons yield per acre in 2007:

$$Gross\ Income = Rolling\ Average\ of\ \frac{\$}{Carton}_{2003-2007} x \frac{Cartons}{Acre}_{2007}$$

$$= \left[\frac{\frac{\$3.67}{Carton_{2003}} + \frac{\$5.51}{Carton_{2004}} + \frac{\$4.68}{Carton_{2005}} + \frac{\$5.19}{Carton_{2006}} + \frac{\$5.64}{Carton_{2007}}}{5}\right] x484 \frac{Cartons}{Acre}$$

$$= \frac{\$2398.70}{Acre}$$

The gross income of citrus crops in 2007 was then updated to 2010 October dollars by the Prices Received Multiplier, as described in the next section.

Price Level Update

A price index is an indication of how prices have changed over time. The most well-known price index is the Consumer Price Index (CPI). However, U.S. Department of Agriculture (USDA) indices are more appropriate for agriculture-specific price adjustments. The latest USDA indices available were for 2010.

USDA indices are separated into different categories. Table 3-16 summarizes the placement of each product in its respective USDA category and its multipliers for prices paid and received.

The categories listed in Table 3-16 under Prices Paid Multiplier were used to adjust the estimates for (1) cultivation cost, (2) harvest/post-harvest cost, (3) establishment cost, and, (4) land cleanup and rehabilitation cost.

However, USDA indices for agriculture for prices received were used to adjust the estimates for gross income. USDA categories used for the price level update can be seen under Price Received Multiplier in Table 3-16.

To update the dollar values from 2001 to 2010, the same price adjustment approach documented in the F-RAM Development was used, as summarized below:

- To correct for cyclical highs or lows, a 5-year moving average was calculated for the indices for the period of 2006 through 2010 to prevent the data from being skewed when changes from 2001 to 2010 were made. However, price indices for the entire year of 2010 were not available as this work was being done. Price indices for the month of April were used to match the dollar values of the housing stock.

- The Prices Paid Multiplier and Price Received Multiplier were calculated using the following equation:

$$multiplier = \frac{(Rolling\ Average\ Price\ Index_{2006-2010})}{Price\ Index_{2001}}$$

- Unit damage cost assumptions from the Comprehensive Study Ag damage spreadsheets (USACE, 2010b) for all crops, except citrus, were adjusted from 2001 to 2010 dollars using the Prices Paid Multiplier only because gross income was a comparatively small part of the entire damage.

Acreage Update

Flood depth grid data were obtained from the Comprehensive Study FLO-2D modeling. New interior-exterior stage relationships were derived from that data using the new exterior river stages from the CVFPP for flood events with AEP of 10, 4, 2, 1, 0.5, and 0.2 percent (10-, 25-, 50-, 100-, 200-, and 500-year return period) (the same approach described in Section 3). The DWR GIS landuse dataset for the Central Valley was overlaid over on the new flood depth grid data to calculate the total inundated acreage for different crops under each flood event. Per DWR landuse data, more than 100 different crops are grown in the SPFC Planning Area. Each DWR crop type was represented by one of the 20 predominant crops types for analytical purposes (see Table 3-15).

Table 3-17 shows total crop acres in the Sacramento River Basin, San Joaquin River Basin, and Stockton area, respectively.

3.9 Business Loss Analysis

Direct flood damages associated with decreased business activity (business losses) caused by flooding were estimated for all affected non-residential structures in damage areas. Flooding in damage areas would force some businesses to temporarily or permanently close (no permanent closures were considered for this analysis), resulting in a decline in business production. Expected annual business losses were estimated for both the Sacramento and San Joaquin river basins. Flood events evaluated were for AEPs of 10, 2, 1, 0.5, and 0.2 percent (10-, 50-, 100-, 200-, and 500-year flood).

Using the structure inventory (described previously), each non-residential structure occupancy type was matched to an Energy Information Administration (EIA) business type and associated Damage Analysis for PLANning (IMPLAN)[9] sector, developed for this project, to obtain economic output per day values per non-residential structure (EIA, 2006; MIG Inc, 2009).

[9] 2009 California County Dataset. The current IMPLAN I-O database and model is maintained and sold by MIG Inc. (MIG Inc., 2009)

Table 3-16. Prices Received and Prices Paid Multipliers for Price Level Update from 2001 to October 2010

Product	Prices Received		Prices Paid	
	USDA Category	Prices Received Multiplier	USDA Category	Prices Paid Multiplier
Alfalfa	Feed Grains and Hay	1.8308	Feed	1.5505
Almonds	Fruits and Nuts	1.3817	Commodity	1.3967
Beans	Potatoes and Dry Beans	1.3624	Commodity	1.3967
Corn	Feed Grains and Hay	1.8308	Feed	1.5505
Cotton	Cotton	1.4531	Commodity	1.3967
Idle	All Other Crops	1.1113	Commodity	1.3967
Melons	Commercial Vegetables	1.1308	Commodity	1.3967
Native Vegetable	All Other Crops	1.0716	Commodity	1.3967
Oranges*	Fruits and Nuts	0.9532	Commodity	1.0671
Pasture	Feed Grains and Hay	1.8308	Feed	1.5505
Peaches	Fruits and Nuts	1.3817	Commodity	1.3967
Pears	Fruits and Nuts	1.3817	Commodity	1.3967
Prunes	Fruits and Nuts	1.3817	Commodity	1.3967
Rice	Food Grain	2.1121	Commodity	1.3967
Safflower	Oil-Bearing Crops	1.9975	Commodity	1.3967
Semi-ag	All Other Crops	1.0716	Commodity	1.3967
Tomatoes	Commercial Vegetables	1.1308	Commodity	1.3967
Walnuts	Fruits and Nuts	1.3817	Commodity	1.3967
Wheat	Food Grain	2.1121	Commodity	1.3967
Wine Grapes	Fruits and Nuts	1.3817	Commodity	1.3967

Source: USDA, 2010
Note:
* Multipliers for oranges to adjust price level from 2007 to October 2010.
Key:
USDA = U.S. Department of Agriculture

Table 3-17. Total Crop Acres

Crop Type	Product	Sacramento River Basin	San Joaquin River Basin	Stockton Area
Citrus				
	Citrus	2,316	117	42
Fruit and Nuts				
	Almonds	25,877	29,356	85
	Walnuts	54,491	5,761	1,996
	Peaches	19,616	494	16
	Pears	8,775	1	0
	Prunes	63,777	1,952	1,340
	Subtotal	**172,536**	**37,563**	3,437
Field				
	Cotton	2,321	77,531	0
	Beans	33,904	13,080	620
	Safflower	62,862	10,015	2,378
	Wheat	82,437	33,406	5,275
	Corn	80,186	64,405	3,351
	Subtotal	**261,709**	**198,438**	11,624
Pasture and Alfalfa				
	Pasture	32,934	31,279	1,040
	Alfalfa	35,159	114,797	3,703
	Subtotal	**68,093**	**146,076**	4,742
Rice				
	Rice	284,507	80	0
Truck				
	Melons	28,717	19,677	4,069
	Tomatoes	56,065	35,295	1,731
	Subtotal	**84,782**	**54,972**	5,801
Vine				
	Wine grapes	13,041	34,716	2,921
Other				
	Idle	29,912	3,392	896
	Semi-agricultural	7,258	9,071	365
	Native vegetation	153,597	180,550	3,374
	Subtotal	**190,767**	**193,014**	4,635
Total		**1,077,751**	**664,976**	**33,201**

Each non-residential structure was matched with the corresponding grid from the derived flood depth grid (the same dataset that was used for the structure damage analysis and derived from the Comprehensive Study flood depth grid data as described previously) to calculate temporary business interruption days for each non-residential structure using a depth-damage function (DDF) provided by the Federal Emergency Management Agency (FEMA). Temporary business interruption days for each non-residential structure were then multiplied by the corresponding economic output per day values to calculate economic output losses per non-residential structure per flood event. Capacity utilization factors were used to account for substitute production of unaffected businesses that would be able to meet a portion of demand for flooded businesses' goods and services. The economic output losses, or business losses, for each non-residential structure were then aggregated for each damage area for each flood event.

A business loss stage-damage curve for the No Project condition was developed for each damage area based on the relationship of the river stage at the index point (from UNET output and applied in the structure damage analysis) and total business losses of the entire damage area under different flood events. These No Project business loss stage-damage curves were applied in HEC-FDA to calculate the business loss EAD for all CVFPP approaches based on the assumptions that this interior-exterior relationship remains independent of conditions like hydrology and levee fragility.

3.9.1 Business Output Relationships Based on Structure Inventory

To estimate total lost business output, it was necessary to estimate the relationship between business output/sales and square footage of inundated businesses. Information used to estimate this relationship is displayed in Table 3-18.

The number of workers per square foot at affected businesses was estimated using data from the EIA[10]. Non-residential occupancy types from the structure inventory (described above) were matched with EIA business categories, and the square footage of each business was divided by square feet per employee to arrive at an estimated number of employees per business. Then, business types were matched to IMPLAN sectors developed for this project, based on counties that damage area reside, and daily production values per employee were taken from IMPLAN per

[10] Energy Information Administration (2006). *2003 Commercial Buildings Energy Consumption Survey - Building Characteristics Tables*, Revised June 2006. Table B1. Summary Table: Total and Means of Floorspace, Number of Workers, and Hours of Operation for Non-Mall Buildings, 2003.

business type. Finally, to obtain daily economic output per business values, the estimates of the number of employees per business were multiplied by daily output per employee figures estimated in the appropriate IMPLAN sector for each affected business.

3.9.2 Business Interruption Days Based on Depth Grid

In addition to daily business output relationships, it was also necessary to understand the temporal implications of business interruption or days of "loss of function". Business interruption is related to the time period businesses are unable to occupy an area and perform economic activities that normally would take place if flooding had not occurred. Businesses, like local residents, would in many cases be unable to occupy structures because of structural damage. Resident displacement was not considered for this analysis, and accordingly no change in the demand for business production was assumed.

Each non-residential structure was matched with the corresponding grid from the derived flood depth grid (the same dataset that was used for the structure damage analysis and derived from the Comprehensive Study flood depth grid data as described previously) to calculate temporary business interruption days for each non-residential structure using a DDF provided by FEMA. Floods evaluated were for AEPs of 10, 2, 1, 0.5, and 0.2 percent (i.e., 10-, 50-, 100-, 200-, and 500-year flood). The DDF relates depth of flooding to structure damage and subsequently, business interruption. Business interruption time includes periods for dewatering, mobilization, building/health inspection, and cleanup. The DDF used is shown in Table 3-19.

Considering the expected flood depth above foundation height, each non-residential structure's number of days of business interruption was estimated for all five flood frequencies. Business interruption times are capped at 365 days for all non-residential structures to avoid overestimation of expected business losses.

3.9.3 Business Loss per Flood Event and Capacity Utilization

For each flood frequency, the number of business interruption days was multiplied by the estimated daily production value for each non-residential structure, which resulted in the potential lost business output for each flood frequency at each non-residential structure. However, it is unlikely that all output would be lost in each area because other businesses in the unaffected parts of the regions would be able to meet some portion of interrupted production. This includes businesses that provide comparable services, as well as alternative locations of the same firm within the region.

The extent of this substitution effect depends on the excess capacity (e.g., ability to increase production) of unaffected businesses in each region.

Capacity utilization data were obtained from two sources – the Federal Reserve and the Institute for Supply Management. The Federal Reserve periodically issues a statistical release on industrial production and capacity utilization for the United States[11]. Historical estimates issued by the Federal Reserve show that capacity utilization has averaged approximately 80.4 percent between 1972 and 2010 (i.e., industrial production operates at 80.4 percent of maximum capacity). These data were applied to the light and heavy industry land use categories used in this study. For all other nonindustrial categories, data from the Institute of Supply Management[12] were used, which showed that current nonmanufacturing utilization of capacity is approximately 82.9 percent.

Potential lost business output for each flood frequency at each non-residential structure was multiplied by the corresponding capacity utilization factor, which resulted in business loss estimates for each non-residential structure for each flood frequency by damage area. Finally, estimated business losses across all nonresidential structures were aggregated for each flood frequency by damage area to determine a business loss frequency-damage curve for each damage area. The frequency-damage curves were then input into HEC-FDA, and expected annual business losses were estimated for No Project and each approach.

[11] Federal Reserve. 2011. Industrial Production and Capacity Utilization, Statistical Release G.17. August 16, 2011

[12] Institute for Supply Management. 2010. December 2010 Semiannual Economic Forecast. Available at:
< http://www.ism.ws/about/MediaRoom/newsreleasedetail.cfm?ItemNumber=20976>

Table 3-18. Employee and Output (2010 $) Relationships for Non-Residential Categories

Non-Residential Category	Principle Business Categories (EIA)	Square Feet Per Employee (EIA)	Daily Output Per Employee (IMPLAN)
C-AUTO	Retail (Other than Mall)	1,246	$206
C-DEAL	Retail (Other than Mall)	1,246	$206
C-FOOD	Food Sales	877	$209
C-FURN	Retail (Other than Mall)	1,246	$232
C-GROC	Food Sales	877	$209
C-HOS	Health Care; Inpatient; Outpatient	501	$356
C-HOTEL	Lodging	2,074	$265
C-MED	Health Care; Inpatient; Outpatient	501	$165
C-OFF	Office	434	$324
C-REST	Food Service	528	$159
C-RESTFF	Food Service	528	$159
C-RET	Retail (Other than Mall)	1,246	$115
C-SERV	Service	1,105	$268
C-SHOP	Retail (Enclosed / Strip Malls)	838	$156
MISC-COM	Retail (Other than Mall)	1,246	$115
IND-HV	Other	956	$835
IND-LT	Other	956	$921
IND-WH	Warehouse and Storage	2,306	$272
MISC-IND	Other	956	$272
PUB-CH	Religious Worship	2,200	$98
PUB-GOV	Public Order and Safety; Office	451	$235
PUB-REC	Public Assembly	1,645	$132
PUB-SCH	Education	791	$153
MISC-PUB	Public Assembly	1,645	$235

Table 3-19. Depth-Damage Function: Depth of Flooding versus Business Interruption

Depth of Flooding Relative to Structure FFE* (feet)	Business Interruption (days)
-2	0
-1	0
0	0
1	45
2	90
3	135
4	180
5	225
6	270
7	315
8	360
9	405
10+	450

Source: FEMA BCA Tool (v4.5.5)4 (FEMA, 2009)
Note:
*FFE is the 1st finished floor elevation. All flood depths are relative to the elevation of the FFE.

3.9.4 Caveats to Business Loss Analysis

Business losses are measured as gross business output or sales. A more appropriate measure of business losses is net income because functional downtime reduces costs as well as receipts. Though net income is a more appropriate measure of business losses, output per employee values used in this analysis are proxy estimates for net income to support approach comparison. At feasibility level analyses, avoided business net income losses will be calculated to support benefit cost evaluation.

If a business is flooded it can (1) make up some of the lost business once it reopens, (2) relocate to a temporary location and continue business while experiencing displacement costs, or (3) go completely out of business. No attempt was made to include these factors in the analysis due to unavailability of required data and detailed analyses.

Labor income is a component of business output losses and includes hourly wages as well as salary compensation. Salaried employees are likely to be paid during short post-disaster business interruptions. Because business losses include hourly wages and salary compensation, it may be the case that only a portion of salary compensation would be lost and business losses may be lower than estimated in this analysis.

3.10 Estimate of Emergency Costs

Emergency costs can be categorized into 18 economic activities that are placed into five groups, and each group has either direct or indirect tangible damages. This section gives an overview of the five groups and also summarizes the different types and numbers of at-risk infrastructure in the Systemwide Planning Area, as well as the at-risk population.

Much has been researched and documented on direct flood damages. However, flood damage data for indirect damages, such as emergency costs, are more limited. Expert-opinion elicitation has been one method used to develop emergency costs. Under the American River Watershed Common Features Project, USACE conducted an expert-opinion elicitation in March 2009 to derive unit flooding emergency cost and relief.

The concept of an emergency cost category is only described in this attachment; the associated cost calculation could be conducted in the 2017 CVFPP economic analysis. It is anticipated that the higher the EAD for a region, the emergency costs will be correspondingly higher.

As mentioned, emergency costs can be categorized into 18 economic activities that were placed into five groups (see Table 3-20):

- **Group 1** – Evacuation activities, including evacuation, subsistence, and reoccupation; direct tangible damages
- **Group 2** – Debris removal and cleanup; direct tangible damages
- **Group 3** – Public services patronized, including education, public agencies, library and indoor recreation facilities, and medical facilities; direct tangible damages
- **Group 4** – Public services produced, including police, incarceration, fire, legislative, and judicial facilities; indirect tangible damages
- **Group 5** – Public utilities, including telecommunications, electricity, gas, water, and wastewater treatment/sewer; direct tangible damages

Table 3-20. Emergency Cost Groups and Categories

Economic Activities	Description
Group 1: Evacuation Activities	
1. Evacuation	Cost of labor, capital, and transportation, for evacuation.
2. Subsistence	Cost of housing people in emergency shelters and providing food and water; includes housing during evacuation.
3. Reoccupation	Costs associated with travel time and transportation modes to preoccupied destinations.
Group 2: Debris Removal and Cleanup	
4. Debris activities	Cost associated with sorting, transporting, processing, and disposal of different types of debris.
Group 3: Public Services Patronized	
5. Education	Cost to continue schooling in new locations to enable the routine mission of education.
6. Public agencies	Cost to continue routine services to maintain social functions.
7. Library and indoor recreation facilities	Cost of loss to serving the public's general information and recreational needs.
8. Medical	Cost to continue providing routine service to people who would have been injured regardless of a flood, at unflooded facilities. Cost of hospital evacuation, disaster medical assistance team, and elder care.
Group 4: Public Services Produced	
9. Police	Cost to continue routine police services for flooded areas and cost to provide emergency flood responses, and relocation of facilities, if necessary.
10. Incarceration	Cost associated with increased security and different transportation modes for evacuation and reoccupation of inmates.
11. Fire	Cost to continue routine fire services for flooded areas, cost to provide emergency flood responses, and relocation of facilities, if necessary
12. Legislative	Costs associated with temporary facilities, increased security needs, and relocation of facilities, if necessary.
13. Judicial	Costs associated with temporary facilities, increased security needs, and relocation of facilities, if necessary.
Group 5: Public Utilities	
14. Telecommunications	Cost associated with increased use of tele-communication equipment and services to carry out routine activities and flood activities. Cost of repairing the physical infrastructure of the telecommunications utility system. Value associated with loss of services.
15. Electricity	Cost of repairing the physical infrastructure of the electricity distribution utility system. Value associated with loss of services.
16. Gas	Cost of repairing the physical infrastructure of the gas utility system. Value associated with loss of services.
17. Water	Cost of repairing the physical infrastructure of the water distribution utility system. Value associated with loss of services.
18. Wastewater treatment/sewer	Cost of repairing the physical infrastructure of the wastewater treatment/sewer utility system. Value associated with loss of services

Group 1 – Evacuation Activities

For evacuation, subsistence, and reoccupation, it is assumed that the population number would remain the same (i.e., no deaths would occur), and that people would use least-cost alternatives and make rational decisions. The analysis for this category also assumes an orderly mandatory evacuation before a flood. Search and rescue activities would be conducted for unevacuated persons, those who declined to evacuate or were unable to successfully evacuate during early evacuation efforts.

Group 2 – Debris Removal and Cleanup

Under debris removal and cleanup activities, it is assumed that no goods would be removed from residences when occupants were evacuated, and that no special measures would be taken to reduce debris generation. Travel needs would increase during a flood because debris material would need to be transported to unflooded destination facilities. Also, temporary structures, such as debris staging areas, would likely be created for flood response.

Group 3 – Public Services Patronized

For public services such as education, public agencies, library, indoor recreation facilities, and medical facilities, it is assumed that the number of users would not change, nor would demand for the service, and that lost service days would be kept to the minimum of time necessary to restart a school. Operations would be the same before and after flooding.

For the acute care portion of a hospital, the economic loss also includes costs to establish alternative facilities and transfer patient services to existing hospitals, as well as the setup cost for a disaster medical assistance team and operation costs.

Group 4 – Public Services Produced

For police, incarceration, fire, legislative, and judicial services, it is assumed that there would be no downscale in operations. For incarceration, it is also assumed that emergency protocols would be made before the flood and other incarceration areas would have excess capacity to absorb inmates; there would be no decline in employees because of the flood; and additional security would be available.

Group 5 – Public Utilities

Infrastructure damage costs are determined from the estimated percent of damage to each infrastructure component over a square mile for residential, commercial, and industrial areas. It is assumed that demand for utilities would remain the same before and after the flood. Also, a value is associated with loss of services due to flood damages to public utilities.

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4.0 Flood Damage Analysis Results

Annual exceedence probability or AEP describes the "protection" against flooding for an impact area, i.e. the likelihood of being flooded in a given year. For example, an impact area with AEP of 6 percent means there is a 6 percent probability that it will be flooded in any given year. In other words, the flooding would occur in 6 years out of 100 on average, or roughly once every 17 years. Calculation of AEP considers the stage-frequency curve and levee performance curve associated with the impact area. The stage-frequency curve is conditionally based on hydrology and assumed upstream levee performance. Changes in upstream levee performance could result in different downstream stage-frequency curves, and thus change the AEP of downstream impact areas even without any risk management actions being taken for the impact area. Therefore, AEP is conditioned on the performance of the entire system.

There are other ways besides AEP to characterize "level of protection." For example, communities sometimes have levee systems that provide a 100-year level of protection in order to meet the minimum standard under the National Flood Insurance Program. In this context, 100-year level of protection is not an estimate of the levee's performance for a given set of conditions. Rather, it is a criteria-based standard under which the levee must meet minimum safety factors when subjected to a 100-year (1 percent AEP) stage that was developed using conservative assumptions about performance of other levees in the region. The AEP for such a levee would typically be much less than 0.01.

All graphic and tabular results referenced in this section have been placed at the end of this section for easier access and readability.

4.1 No Project Condition

Through Monte Carlo sampling of the stage-frequency, levee performance, and stage-damage curves, along with their uncertainties for each parcel in a damage area, the EAD for the No Project condition was calculated for each damage area of the Sacramento River Basin, the San Joaquin River Basin, and the Stockton area.

4.1.1 Sacramento River Basin

Table 4-1 shows the EAD for structure and contents, crops, and business loss for each damage area. For structure and contents damages, SAC63

(Sacramento South) has the highest EAD, followed by SAC25 (Yuba City). For crop damages, SAC05 (Butte Basin) has the highest EAD, followed by SAC30 (RD 1001). For business loss damages, SAC63 (Sacramento South) has the highest EAD, followed by SAC40 (Sacramento North).

Table 4-2 shows the AEP for the Sacramento River Basin for the No Project condition and all approaches. For AEP, the larger the number, the greater the flood risk to the damage area (i.e., an AEP of 0.10 (10-year return period) has a greater flood risk than an AEP of 0.010 (100-year return period)).

4.1.2 San Joaquin River Basin

Table 4-3 shows the EAD for structure and contents, crops, and business loss for each damage area. For structure and contents damages, STK10 (Central Stockton) has the highest EAD, followed by SJ33 (Lathrop/Sharpe). For crop damages, SJ12 (Berenda Slough) has the highest EAD, followed by SJ15 (Turner Island). For business loss damages, SJ25 (Modesto) has the highest EAD, followed by SJ33 (Lathrop/Sharpe).

Table 4-4 shows the AEP for the San Joaquin River Basin and Stockton area for the No Project condition and all approaches.

4.2 Achieve SPFC Design Flow Capacity Approach

Through Monte Carlo sampling of the stage-frequency, levee performance, and stage-damage curves, along with their uncertainties for each parcel in a damage area, the EAD for the Achieve SPFC Design Flow Capacity Approach was calculated for each damage area in the Sacramento and San Joaquin river basins and Stockton area.

4.2.1 Sacramento River Basin

Table 4-5 shows the EAD for structure and contents, crops, and business loss for each damage area. For structure and contents damages, SAC63 (Sacramento South) has the highest EAD, followed by SAC36 (Natomas). For crop damages, SAC04 (Capay) has the highest EAD, followed by SAC35 (Elkhorn). For business loss damages, SAC63 (Sacramento South) has the highest EAD, followed by SAC40 (Sacramento North).

Table 4-2 shows the AEP for the Sacramento River Basin for the No Project condition and all approaches.

4.2.2 San Joaquin River Basin

Table 4-6 shows the EAD for structure and contents, crops, and business loss for each damage area. For structure and contents damages, SJ34 (French Camp) has the highest EAD, followed by SJ09 (Salt Slough). For crop damages, SJ09 (Salt Slough) has the highest EAD, followed by SJ20 (Merced River). For business loss damages, SJ25 (Modesto) has the highest EAD, followed by SJ24 (Tuolumne River).

Table 4-4 shows the AEP for the San Joaquin River Basin and Stockton area for the No Project condition and all approaches.

4.3 Protect High Risk Communities

Through Monte Carlo sampling of the stage-frequency, levee performance, and stage-damage curves, along with their uncertainties for each parcel in a damage area, the EAD for the Protect High Risk Communities Approach was calculated for each damage area in the Sacramento and San Joaquin river basins and Stockton area.

4.3.1 Sacramento River Basin

Table 4-7 shows the EAD for structure and contents, crops, and business loss for each damage area. For structure and contents damages, SAC63 (Sacramento North) has the highest EAD, followed by SAC40 (Sacramento North). For crop damages, SAC05 (Butte Basin) has the highest EAD, followed by SAC24 (Levee District No.1). For business loss damages, SAC63 (Sacramento South) has the highest EAD, followed by SAC40 (Sacramento North).

Table 4-2 shows the AEP for the Sacramento River Basin for the No Project condition and all approaches.

4.3.2 San Joaquin River Basin

Table 4-8 shows the EAD for structure and contents, crops, and business loss for each damage area. For structure and contents damages, SJ09 (Salt Slough) has the highest EAD, followed by SJ28 (Stanislaus North). For crop damages, SJ12 (Berenda Slough) has the highest EAD, followed by SJ15 (Turner Island). For business loss damages, SJ25 (Modesto) has the highest EAD, followed by SJ09 (Salt Slough).

Table 4-4 shows the AEP for the San Joaquin River Basin and Stockton area for the No Project condition and all approaches.

4.4 Enhance Flood System Capacity

Through Monte Carlo sampling of the stage-frequency, levee performance, and stage-damage curves, along with their uncertainties for each parcel in a damage area, the EAD for the Enhance Flood System Capacity Approach was calculated for each damage area in the Sacramento and San Joaquin river basins and Stockton area.

4.4.1 Sacramento River Basin

Table 4-9 shows the EAD for structure and contents, crops, and business loss for each damage area. For structure and contents damages, SAC63 (Sacramento North) has the highest EAD, followed by SAC40 (Sacramento North). For crop damages, SAC04 (Capay) has the highest EAD, followed by SAC01 (Woodson Bridge East). For business loss damages, SAC63 (Sacramento South) has the highest EAD, followed by SAC40 (Sacramento North).

Table 4-2 shows the AEP for the Sacramento River Basin for the No Project condition and all approaches.

4.4.2 San Joaquin River Basin

Table 4-10 shows the EAD for structure and contents, crops, and business loss for each damage area. For structure and contents damages, SJ09 (Salt Slough) has the highest EAD, followed by SJ33 (Lathrop/Sharpe). For crop damages, SJ09 (Salt Slough) has the highest EAD, followed by SJ20 (Merced River). For business loss damages, SJ25 (Modesto) has the highest EAD, followed by SJ09 (Salt Slough).

Table 4-4 shows the AEP for the San Joaquin River Basin and Stockton area for the No Project condition and all approaches.

4.5 State Systemwide Investment Approach

Through Monte Carlo sampling of the stage-frequency, levee performance, and stage-damage curves, along with their uncertainties for each parcel in a damage area, the EAD for the State Systemwide Investment Approach was calculated for each damage area in the Sacramento River Basin, the San Joaquin River Basin, and Stockton area.

4.5.1 Sacramento River Basin

Table 4-11 shows the EAD for structure and contents, crops, and business loss for each damage area. For structure and contents damages, SAC63 (Sacramento North) has the highest EAD, followed by SAC40 (Sacramento

North). For crop damages, SAC05 (Butte Basin) has the highest EAD, followed by SAC35 (Elkhorn). For business loss damages, SAC63 (Sacramento South) has the highest EAD, followed by SAC40 (Sacramento North).

Table 4-2 shows the AEP for the Sacramento River Basin for the No Project condition and all approaches.

4.5.2 San Joaquin River Basin

Table 4-12 shows the EAD for structure and contents, crops, and business loss for each damage area. For structure and contents damages, SJ09 (Salt Slough) has the highest EAD, followed by SJ28 (Stanislaus North). For crop damages, SJ12 (Berenda Slough) has the highest EAD, followed by SJ15 (Turner Island). For business loss damages, SJ25 (Modesto) has the highest EAD, followed by SJ09 (Salt Slough).

Table 4-4 shows the AEP for the San Joaquin River Basin and Stockton area for the No Project condition and all approaches.

Table 4-1. HEC-FDA Expected Annual Damages for Sacramento River Basin in 2010 October $1,000 – No Project

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SAC01	Woodson Bridge East	26	213	8	246
SAC02	Woodson Bridge West	4	9	0	13
SAC03	Hamilton City	495	0	31	526
SAC04	Capay	38	730	74	842
SAC05	Butte Basin	239	2,339	187	2,764
SAC06	Butte City	6	0	0	6
SAC07	Colusa Basin North	67	65	18	151
SAC08	Colusa	32	1	3	35
SAC09	Colusa Basin South	159	515	55	728
SAC10	Grimes	8	1	0	10
SAC11	Reclamation District 1500 West	109	190	56	355
SAC12	Sycamore Slough	1	44	0	45
SAC13	Knight's Landing	1,207	3	354	1,564
SAC14	Ridge Cut (North)	1	38	0	39
SAC15	Ridge Cut (South)	8.7	68	0	76
SAC16	Reclamation District 2035	3	265	1	269
SAC17	East of Davis	109	7	20	136
SAC18	Upper Honcut	23	60	0	83
SAC20	Gridley	407	17	9	433
SAC21	Sutter Buttes East	500	495	45	1,040
SAC22	Live Oak	780	7	39	827
SAC23	Lower Honcut	162	147	58	367
SAC24	Levee District No.1	496	460	113	1,069
SAC25	Yuba City	47,862	123	10,959	58,944
SAC26	Marysville	281	0	84	365
SAC27	Linda-Olivehurst	1,611	18	451	2,080
SAC28	Reclamation District 784	721	76	22	818
SAC29	Best Slough	388	323	29	740
SAC30	Reclamation District 1001	217	1,538	34	1,789
SAC32	Reclamation District 70-1660	185	456	114	755
SAC33	Meridian	138	2	61	201

Table 4-1. HEC-FDA Expected Annual Damages for Sacramento River Basin in 2010 October $1,000 – No Project (contd.)

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SAC34	Reclamation District 1500 East	191	466	232	889
SAC35	Elkhorn	113	1,353	5	1,471
SAC36	Natomas	44,004	120	10,058	54,181
SAC37	Rio Linda	2,993	2	1,922	4,917
SAC38	West Sacramento	5,679	1	2,848	8,528
SAC39	Reclamation District 900	4,877	12	187	5,076
SAC40	Sacramento North	16,622	0	11,014	27,636
SAC41	Reclamation District 302	22	69	1	91
SAC42	Reclamation District 999	55	101	2	158
SAC43	Clarksburg	38	0	9	47
SAC44	Stone Lake	3,068	214	1,489	4,770
SAC45	Hood	561	0	2,092	2,653
SAC46	Merritt Island	77	133	0	210
SAC47	Reclamation District 551	174	1,111	731	2,016
SAC48	Courtland	264	3	320	587
SAC49	Sutter Island	18	774	0	792
SAC50	Grand Island	615	1,500	307	2,423
SAC51	Locke	24	4	65	93
SAC52	Walnut Grove	15	0	8	22
SAC53	Tyler Island	95	405	121	622
SAC54	Andrus Island	132	212	108	452
SAC55	Ryer Island	92	564	0	656
SAC56	Prospect Island	14	133	24	171
SAC57	Twitchell Island	0	0	0	0
SAC58	Sherman Island	180	219	605	1,004
SAC59	Moore	31	84	0	115
SAC60	Cache Slough	3	10	0	13
SAC61	Hastings	21	120	0	141
SAC62	Lindsey Slough	65	237	0	303
SAC63	Sacramento South	69,832	5	37,283	107,120
	Total	**206,158**	**16,062**	**82,257**	**304,476**

Key:
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis

Table 4-2. HEC-FDA Expected Flooding Return Period in Years for the Sacramento River Basin – All Approaches

Damage Area	Description	No Project	SPFC	PHRC	EFSC	SSIA
SAC01	Woodson Bridge East	> 200	> 200	> 200	> 200	> 200
SAC02	Woodson Bridge West	> 200	> 200	> 200	> 200	> 200
SAC03	Hamilton City	25 - 100	25 - 100	25 - 100	25 - 100	25 - 100
SAC04	Capay	<25	<25	<25	<25	<25
SAC05	Butte Basin	25 - 100	> 200	25 - 100	> 200	25 - 100
SAC06	Butte City	25 - 100	> 200	25 - 100	25 - 100	25 - 100
SAC07	Colusa Basin North	> 200	> 200	> 200	> 200	> 200
SAC08	Colusa	100 - 200	> 200	100 - 200	> 200	100 - 200
SAC09	Colusa Basin South	25 - 100	> 200	25 - 100	> 200	25 - 100
SAC10	Grimes	25 - 100	> 200	25 - 100	> 200	25 - 100
SAC11	Reclamation District 1500 West	25 - 100	> 200	25 - 100	> 200	25 - 100
SAC12	Sycamore Slough	100 - 200	> 200	100 - 200	> 200	> 200
SAC13	Knight's Landing	25 - 100	25 - 100	25 - 100	> 200	25 - 100
SAC14	Ridge Cut (North)	25 - 100	> 200	25 - 100	> 200	25 - 100
SAC15	Ridge Cut (South)	<25	> 200	<25	> 200	<25
SAC16	Reclamation District 2035	<25	> 200	<25	> 200	<25
SAC17	East of Davis	> 200	> 200	> 200	> 200	> 200
SAC18	Upper Honcut	> 200	> 200	> 200	> 200	> 200
SAC20	Gridley	25 - 100	> 200	25 - 100	> 200	100 - 200
SAC21	Sutter Buttes East	25 - 100	> 200	25 - 100	> 200	100 - 200
SAC22	Live Oak	25 - 100	> 200	25 - 100	> 200	100 - 200
SAC23	Lower Honcut	> 200	> 200	> 200	> 200	> 200
SAC24	Levee District No.1	<25	100 - 200	<25	> 200	<25
SAC25	Yuba City	<25	> 200	> 200	> 200	> 200
SAC26	Marysville	> 200	> 200	> 200	> 200	> 200
SAC27	Linda-Olivehurst	> 200	> 200	> 200	> 200	> 200
SAC28	Reclamation District 784	> 200	> 200	> 200	> 200	> 200
SAC29	Best Slough	<25	100 - 200	<25	<25	<25
SAC30	Reclamation District 1001	<25	> 200	<25	> 200	<25
SAC32	Reclamation District 70-1660	<25	> 200	<25	> 200	<25
SAC33	Meridian	<25	> 200	<25	> 200	<25

Table 4-2. HEC-FDA Expected Flooding Return Period in Years for the Sacramento River Basin – All Approaches (contd.)

Damage Area	Description	No Project	SPFC	PHRC	EFSC	SSIA
SAC34	Reclamation District 1500 East	25 - 100	> 200	25 - 100	> 200	25 - 100
SAC35	Elkhorn	<25	> 200	<25	<25	<25
SAC36	Natomas	<25	> 200	> 200	> 200	> 200
SAC37	Rio Linda	100 - 200	> 200	> 200	> 200	> 200
SAC38	West Sacramento	25 - 100	> 200	> 200	> 200	> 200
SAC39	Reclamation District 900	<25	> 200	> 200	> 200	> 200
SAC40	Sacramento North	25 - 100	100 - 200	> 200	> 200	> 200
SAC41	Reclamation District 302	<25	100 - 200	<25	> 200	<25
SAC42	Reclamation District 999	<25	100 - 200	<25	> 200	<25
SAC43	Clarksburg	25 - 100	100 - 200	25 - 100	> 200	25 - 100
SAC44	Stone Lake	<25	100 - 200	> 200	<25	> 200
SAC45	Hood	<25	100 - 200	> 200	> 200	> 200
SAC46	Merritt Island	25 - 100	100 - 200	25 - 100	> 200	25 - 100
SAC47	Reclamation District 551	<25	> 200	<25	> 200	<25
SAC48	Courtland	<25	> 200	<25	> 200	<25
SAC49	Sutter Island	<25	> 200	<25	> 200	<25
SAC50	Grand Island	<25	> 200	<25	> 200	<25
SAC51	Locke	100 - 200	> 200	100 - 200	> 200	> 200
SAC52	Walnut Grove	100 - 200	> 200	100 - 200	> 200	> 200
SAC53	Tyler Island	<25	> 200	<25	> 200	<25
SAC54	Andrus Island	25 - 100	100 - 200	25 - 100	> 200	25 - 100
SAC55	Ryer Island	<25	> 200	<25	> 200	<25
SAC56	Prospect Island	<25	> 200	<25	> 200	<25
SAC57	Twitchell Island	100 - 200	> 200	100 - 200	> 200	100 - 200
SAC58	Sherman Island	<25	> 200	<25	> 200	<25
SAC59	Moore	<25	25 - 100	<25	25 - 100	<25
SAC60	Cache Slough	<25	<25	<25	<25	<25
SAC61	Hastings	<25	25 - 100	<25	> 200	<25
SAC62	Lindsey Slough	<25	> 200	<25	> 200	<25
SAC63	Sacramento South	25 - 100	100 - 200	> 200	> 200	> 200

Note: The HEC-FDA expected flooding return period for each damage area is based on its corresponding levee performance curve and overall systemwide hydraulic performance upstream of the damage area. For the purposes of hydraulic modeling on a systemwide scale, a reconstructed levee is assumed to have zero probability of failure until it is overtopped.
Key:
EFSC = Enhance Flood System Capacity Approach
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis
PHRC = Protect High Risk Communities Approach
RD = Reclamation District
SPFC = Achieve SPFC Design Flow Capacity Approach
SSIA = State Systemwide Investment Approach

Table 4-3. HEC-FDA Expected Annual Damages for the San Joaquin River Basin and Stockton Area in 2010 October $1,000 – No Project

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SJ01	Fresno	76	3	7	86
SJ02	Fresno Slough East	94	364	5	463
SJ03	Fresno Slough West	6	80	0	86
SJ04	Mendota	27	0	0	28
SJ05	Chowchilla Bypass	41	728	0	769
SJ06	Lone Willow Slough	15	464	0	479
SJ07	Mendota North	1	10	0	10
SJ08	Firebaugh	22	0	0	22
SJ09	Salt Slough	909	2,092	84	3,085
SJ10	Dos Palos	235	18	4	256
SJ11	Fresno River	7	489	0	496
SJ12	Berenda Slough	271	3,436	10	3,716
SJ13	Ash Slough	25	724	6	754
SJ14	Sandy Mush	10	429	1	440
SJ15	Turner Island	46	2,500	0	2,546
SJ16	Bear Creek	12	29	1	42
SJ17	Deep Slough	6	27	0	33
SJ18	West Bear Creek	31	91	7	129
SJ19	Fremont Ford	3	4	0	8
SJ20	Merced River	142	842	27	1,011
SJ21	Merced River North	86	218	71	376
SJ22	Orestimba	25	30	13	68
SJ23	Tuolumne South	57	239	8	303
SJ24	Tuolumne River	247	18	70	335
SJ25	Modesto	237	1	192	431
SJ26	Three Amigos	18	221	6	245
SJ27	Stanislaus South	44	131	8	183
SJ28	Stanislaus North	277	346	33	656
SJ29	Banta Carbona	123	127	2	251
SJ30	Paradise Cut	33	183	2	218
SJ31	Stewart Tract	0	2	0	2
SJ32	East Lathrop	35	7	29	71

Table 4-3. HEC-FDA Expected Annual Damages for the San Joaquin River Basin and Stockton Area in 2010 October $1,000 – No Project (contd.)

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SJ33	Lathrop/Sharpe	1,189	6	117	1,312
SJ34	French Camp	54	3	0	58
SJ35	Moss Tract	163	0	17	180
SJ36	Roberts Island	134	647	6	787
SJ37	Rough and Ready Island	0	1	1	2
SJ38	Drexler Tract	17	68	6	91
SJ39	Union Island	22	81	5	107
SJ40	Union Island Toe	10	15	0	25
SJ41	Fabian Tract	3	14	0	17
SJ42	Reclamation District 1007	8	9	0	17
SJ43	Grayson	28	0	1	29
STK01	Lower Roberts Island	108	537	72	716
STK06	Stockton East	124	8	32	163
STK07	Calaveras River	802	0	39	840
STK08	Bear Creek South	568	0	1	569
STK09	Bear Creek North	616	2	0	618
STK10	Central Stockton	1,786	1	79	1,866
	Total	**8,791**	**15,243**	**962**	**24,996**

Key:
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis

Table 4-4. HEC-FDA Expected Flooding Return Period in Years for San Joaquin River Basin and Stockton Area – All Approaches

Damage Area	Description	No Project	SPFC	PHRC	EFSC	SSIA
SJ01	Fresno	> 200	> 200	> 200	> 200	> 200
SJ02	Fresno Slough East	25 - 100	25 - 100	25 - 100	25 - 100	25 - 100
SJ03	Fresno Slough West	25 - 100	25 - 100	25 - 100	25 - 100	25 - 100
SJ04	Mendota	25 - 100	25 - 100	25 - 100	100 - 200	25 - 100
SJ05	Chowchilla Bypass	<25	25 - 100	<25	100 - 200	<25
SJ06	Lone Willow Slough	25 - 100	25 - 100	25 - 100	25 - 100	25 - 100
SJ07	Mendota North	> 200	> 200	> 200	> 200	> 200
SJ08	Firebaugh	> 200	> 200	> 200	> 200	> 200
SJ09	Salt Slough	25 - 100	25 - 100	25 - 100	25 - 100	25 - 100
SJ10	Dos Palos	25 - 100	25 - 100	25 - 100	25 - 100	25 - 100
SJ11	Fresno River	<25	> 200	<25	> 200	<25
SJ12	Berenda Slough	<25	> 200	<25	> 200	<25
SJ13	Ash Slough	<25	> 200	<25	> 200	<25
SJ14	Sandy Mush	<25	> 200	<25	100 - 200	<25
SJ15	Turner Island	<25	25 - 100	<25	25 - 100	<25
SJ16	Bear Creek	100 - 200	100 - 200	100 - 200	100 - 200	100 - 200
SJ17	Deep Slough	25 - 100	> 200	25 - 100	> 200	25 - 100
SJ18	West Bear Creek	<25	100 - 200	<25	> 200	<25
SJ19	Fremont Ford	> 200	> 200	> 200	> 200	> 200
SJ20	Merced River	<25	<25	<25	<25	<25
SJ21	Merced River North	25 - 100	> 200	25 - 100	> 200	25 - 100
SJ22	Orestimba	<25	> 200	<25	> 200	<25
SJ23	Tuolumne South	<25	<25	<25	<25	<25
SJ24	Tuolumne River	<25	<25	> 200	> 200	> 200
SJ25	Modesto	> 200	> 200	> 200	> 200	> 200
SJ26	Three Amigos	<25	> 200	<25	> 200	<25
SJ27	Stanislaus South	<25	100 - 200	<25	> 200	<25
SJ28	Stanislaus North	25 - 100	25 - 100	25 - 100	> 200	25 - 100
SJ29	Banta Carbona	<25	> 200	<25	> 200	<25
SJ30	Paradise Cut	<25	> 200	<25	> 200	<25
SJ31	Stewart Tract	> 200	> 200	> 200	> 200	> 200
SJ32	East Lathrop	> 200	> 200	> 200	> 200	> 200

Table 4-4. HEC-FDA Expected Flooding Return Period in Years for San Joaquin River Basin and Stockton Area – All Approaches (contd.)

Damage Area	Description	No Project	SPFC	PHRC	EFSC	SSIA
SJ33	Lathrop/Sharpe	100 - 200	> 200	> 200	> 200	> 200
SJ34	French Camp	> 200	> 200	> 200	> 200	> 200
SJ35	Moss Tract	100 - 200	> 200	> 200	> 200	> 200
SJ36	Roberts Island	<25	> 200	<25	> 200	<25
SJ37	Rough and Ready Island	> 200	> 200	> 200	> 200	> 200
SJ38	Drexler Tract	25 - 100	25 - 100	25 - 100	25 - 100	25 - 100
SJ39	Union Island	25 - 100	25 - 100	25 - 100	25 - 100	25 - 100
SJ40	Union Island Toe	25 - 100	> 200	25 - 100	> 200	25 - 100
SJ41	Fabian Tract	100 - 200	100 - 200	100 - 200	> 200	100 - 200
SJ42	Reclamation District 1007	> 200	100 - 200	> 200	100 - 200	> 200
SJ43	Grayson	100 - 200	> 200	100 - 200	> 200	100 - 200
STK01	Lower Roberts Island	<25	> 200	> 200	> 200	> 200
STK06	Stockton East	25 - 100	100 - 200	100 - 200	100 - 200	100 - 200
STK07	Calaveras River	100 - 200	> 200	> 200	> 200	> 200
STK08	Bear Creek South	100 - 200	100 - 200	100 - 200	100 - 200	100 - 200
STK09	Bear Creek North	25 - 100	100 - 200	100 - 200	100 - 200	100 - 200
STK10	Central Stockton	<25	> 200	> 200	> 200	> 200

Note: The HEC-FDA expected flooding return period for each damage area is based on its corresponding levee performance curve and overall systemwide hydraulic performance upstream of the damage area. For the purposes of hydraulic modeling on a systemwide scale, a reconstructed levee is assumed to have zero probability of failure until it is overtopped.
Key:
EFSC = Enhance Flood System Capacity Approach
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis
PHRC = Protect High Risk Communities Approach
SPFC = Achieve SPFC Design Flow Capacity Approach
SSIA = State Systemwide Investment Approach

Table 4-5. HEC-FDA Expected Annual Damages for Sacramento River Basin in 2010 October $1,000 – Achieve SPFC Design Flow Capacity Approach

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SAC01	Woodson Bridge East	27	213	8	247
SAC02	Woodson Bridge West	4	10	0	13
SAC03	Hamilton City	519	0	35	554
SAC04	Capay	46	735	76	857
SAC05	Butte Basin	38	130	23	191
SAC06	Butte City	2	0	0	2
SAC07	Colusa Basin North	47	28	10	85
SAC08	Colusa	87	1	4	92
SAC09	Colusa Basin South	42	61	6	110
SAC10	Grimes	5	0	0	5
SAC11	Reclamation District 1500 West	14	23	5	43
SAC12	Sycamore Slough	0	7	0	8
SAC13	Knight's Landing	622	2	205	829
SAC14	Ridge Cut (North)	1	13	0	14
SAC15	Ridge Cut (South)	1	2	0	3
SAC16	Reclamation District 2035	6	9	0	16
SAC17	East of Davis	87	3	10	101
SAC18	Upper Honcut	9	13	0	22
SAC20	Gridley	237	2	3	243
SAC21	Sutter Buttes East	232	68	16	316
SAC22	Live Oak	357	1	15	373
SAC23	Lower Honcut	98	88	31	217
SAC24	Levee District No.1	155	0	8	164
SAC25	Yuba City	4,694	12	698	5,404
SAC26	Marysville	271	0	80	350
SAC27	Linda-Olivehurst	1,678	18	470	2,166
SAC28	Reclamation District 784	956	95	28	1,079
SAC29	Best Slough	54	43	7	104
SAC30	Reclamation District 1001	30	35	5	71
SAC32	Reclamation District 70-1660	45	83	22	149
SAC33	Meridian	30	0	11	41

Table 4-5. HEC-FDA Expected Annual Damages for Sacramento River Basin in 2010 October $1,000 – Achieve SPFC Design Flow Capacity Approach (contd.)

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SAC34	Reclamation District 1500 East	21	19	18	58
SAC35	Elkhorn	35	194	1	230
SAC36	Natomas	15,551	67	4,333	19,951
SAC37	Rio Linda	3,568	3	2,311	5,882
SAC38	West Sacramento	3,280	0	1,581	4,862
SAC39	Reclamation District 900	2,094	7	81	2,182
SAC40	Sacramento North	11,665	0	7,553	19,219
SAC41	Reclamation District 302	13	62	0	76
SAC42	Reclamation District 999	90	114	2	206
SAC43	Clarksburg	73	0	16	90
SAC44	Stone Lake	6,310	155	402	6,868
SAC45	Hood	63	0	177	240
SAC46	Merritt Island	17	92	0	109
SAC47	Reclamation District 551	40	104	113	256
SAC48	Courtland	55	0	55	111
SAC49	Sutter Island	0	8	0	8
SAC50	Grand Island	1	1	0	2
SAC51	Locke	28	2	88	118
SAC52	Walnut Grove	0	0	0	0
SAC53	Tyler Island	0	0	0	0
SAC54	Andrus Island	225	91	124	441
SAC55	Ryer Island	0	0	0	0
SAC56	Prospect Island	1	2	1	4
SAC57	Twitchell Island	0	0	0	0
SAC58	Sherman Island	21	5	68	93
SAC59	Moore	34	27	0	61
SAC60	Cache Slough	18	24	0	42
SAC61	Hastings	8	29	0	37
SAC62	Lindsey Slough	3	6	0	9
SAC63	Sacramento South	66,184	5	34,860	101,049
	Total	**119,796**	**2,714**	**53,562**	**176,072**

Key:
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis
SPFC = State Plan of Flood Control

Table 4-6. HEC-FDA Expected Annual Damages for San Joaquin River Basin and Stockton Area in 2010 October $1,000 – Achieve SPFC Design Flow Capacity Approach

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SJ01	Fresno	76	3	7	86
SJ02	Fresno Slough East	95	359	5	459
SJ03	Fresno Slough West	6	80	0	86
SJ04	Mendota	28	0	0	28
SJ05	Chowchilla Bypass	17	381	0	398
SJ06	Lone Willow Slough	110	481	0	591
SJ07	Mendota North	1	10	0	10
SJ08	Firebaugh	26	0	0	26
SJ09	Salt Slough	725	1,643	65	2,433
SJ10	Dos Palos	193	14	3	209
SJ11	Fresno River	1	36	0	37
SJ12	Berenda Slough	15	70	0	86
SJ13	Ash Slough	9	34	1	44
SJ14	Sandy Mush	2	6	0	9
SJ15	Turner Island	15	256	0	271
SJ16	Bear Creek	13	35	1	49
SJ17	Deep Slough	3	9	0	12
SJ18	West Bear Creek	19	20	2	40
SJ19	Fremont Ford	1	0	0	1
SJ20	Merced River	138	840	27	1,004
SJ21	Merced River North	28	15	8	51
SJ22	Orestimba	3	1	1	4
SJ23	Tuolumne South	89	328	11	428
SJ24	Tuolumne River	289	18	70	377
SJ25	Modesto	238	1	193	432
SJ26	Three Amigos	13	45	2	60
SJ27	Stanislaus South	26	40	3	69
SJ28	Stanislaus North	230	141	17	387
SJ29	Banta Carbona	207	37	2	247
SJ30	Paradise Cut	3	2	0	5
SJ31	Stewart Tract	0	2	0	2
SJ32	East Lathrop	30	5	22	57

Table 4-6 HEC-FDA Expected Annual Damages for San Joaquin River Basin and Stockton Area in 2010 October $1,000 – Achieve SPFC Design Flow Capacity Approach (contd.)

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SJ33	Lathrop/Sharpe	598	2	32	631
SJ34	French Camp	1,125	16	0	1,142
SJ35	Moss Tract	3	0	0	3
SJ36	Roberts Island	23	42	1	67
SJ37	Rough and Ready Island	0	1	1	2
SJ38	Drexler Tract	32	93	10	135
SJ39	Union Island	28	205	7	241
SJ40	Union Island Toe	2	3	0	5
SJ41	Fabian Tract	5	24	1	29
SJ42	Reclamation District 1007	11	14	0	24
SJ43	Grayson	32	0	1	33
STK01	Lower Roberts Island	0	0	0	0
STK06	Stockton East	46	4	17	67
STK07	Calaveras River	15	0	0	15
STK08	Bear Creek South	27	0	0	27
STK09	Bear Creek North	22	0	0	22
STK10	Central Stockton	0	0	0	0
	Total	**4,615**	**5,315**	**511**	**10,441**

Key:
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis
SPFC = State Plan of Flood Control

Table 4-7. HEC-FDA Expected Annual Damages for Sacramento River Basin in 2010 October $1,000 – Protect High Risk Communities Approach

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SAC01	Woodson Bridge East	26	213	8	246
SAC02	Woodson Bridge West	4	9	0	13
SAC03	Hamilton City	488	0	32	521
SAC04	Capay	37	730	74	842
SAC05	Butte Basin	239	2,339	187	2,764
SAC06	Butte City	6	0	0	6
SAC07	Colusa Basin North	65	65	18	149
SAC08	Colusa	55	1	4	61
SAC09	Colusa Basin South	159	515	55	728
SAC10	Grimes	8	1	0	10
SAC11	Reclamation District 1500 West	109	190	56	356
SAC12	Sycamore Slough	1	45	0	45
SAC13	Knight's Landing	1,311	3	255	1,568
SAC14	Ridge Cut (North)	1	38	0	39
SAC15	Ridge Cut (South)	9	68	0	77
SAC16	Reclamation District 2035	3	265	1	269
SAC17	East of Davis	56	2	7	65
SAC18	Upper Honcut	24	60	0	83
SAC20	Gridley	410	17	9	437
SAC21	Sutter Buttes East	501	496	46	1,043
SAC22	Live Oak	781	8	40	828
SAC23	Lower Honcut	181	161	62	405
SAC24	Levee District No.1	1,424	2,238	498	4,159
SAC25	Yuba City	3,919	10	583	4,511
SAC26	Marysville	282	0	83	365
SAC27	Linda-Olivehurst	1,683	18	470	2,171
SAC28	Reclamation District 784	783	80	24	887
SAC29	Best Slough	388	323	29	740
SAC30	Reclamation District 1001	218	1,540	35	1,793
SAC32	Reclamation District 70-1660	185	456	114	755
SAC33	Meridian	138	2	61	201

Table 4-7. HEC-FDA Expected Annual Damages for Sacramento River Basin in 2010 October $1,000 – Protect High Risk Communities Approach (contd.)

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SAC34	Reclamation District 1500 East	192	467	233	893
SAC35	Elkhorn	113	1,357	5	1,476
SAC36	Natomas	3,671	15	1,192	4,878
SAC37	Rio Linda	1,813	1	1,088	2,902
SAC38	West Sacramento	2,135	0	987	3,122
SAC39	Reclamation District 900	660	2	23	685
SAC40	Sacramento North	5,454	0	3,082	8,536
SAC41	Reclamation District 302	24	79	1	104
SAC42	Reclamation District 999	82	112	2	196
SAC43	Clarksburg	55	0	13	68
SAC44	Stone Lake	380	11	26	417
SAC45	Hood	4	0	12	17
SAC46	Merritt Island	81	124	0	205
SAC47	Reclamation District 551	172	1,089	703	1,964
SAC48	Courtland	257	3	306	566
SAC49	Sutter Island	18	767	0	785
SAC50	Grand Island	570	1,490	300	2,361
SAC51	Locke	22	4	59	85
SAC52	Walnut Grove	15	0	7	22
SAC53	Tyler Island	92	400	116	608
SAC54	Andrus Island	120	203	92	416
SAC55	Ryer Island	96	565	0	661
SAC56	Prospect Island	14	133	24	171
SAC57	Twitchell Island	3	0	0	3
SAC58	Sherman Island	178	211	585	975
SAC59	Moore	32	84	0	115
SAC60	Cache Slough	3	10	0	13
SAC61	Hastings	22	121	0	143
SAC62	Lindsey Slough	66	237	0	304
SAC63	Sacramento South	29,655	2	13,488	43,145
	Total	**59,496**	**17,381**	**25,095**	**101,972**

Key:
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis

Table 4-8. HEC-FDA Expected Annual Damages for San Joaquin River Basin and Stockton Area in 2010 October $1,000 – Protect High Risk Communities Approach

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SJ01	Fresno	76	3	7	86
SJ02	Fresno Slough East	94	364	5	463
SJ03	Fresno Slough West	6	80	0	86
SJ04	Mendota	27	0	0	28
SJ05	Chowchilla Bypass	41	728	0	769
SJ06	Lone Willow Slough	15	464	0	479
SJ07	Mendota North	1	10	0	10
SJ08	Firebaugh	24	0	0	24
SJ09	Salt Slough	899	2,062	83	3,044
SJ10	Dos Palos	235	18	4	256
SJ11	Fresno River	7	489	0	496
SJ12	Berenda Slough	271	3,436	10	3,716
SJ13	Ash Slough	25	724	6	754
SJ14	Sandy Mush	12	429	1	442
SJ15	Turner Island	46	2,500	0	2,546
SJ16	Bear Creek	12	29	1	42
SJ17	Deep Slough	6	27	0	33
SJ18	West Bear Creek	31	91	7	129
SJ19	Fremont Ford	3	4	0	8
SJ20	Merced River	142	842	27	1,011
SJ21	Merced River North	87	219	72	378
SJ22	Orestimba	24	31	13	69
SJ23	Tuolumne South	71	278	9	357
SJ24	Tuolumne River	147	9	30	186
SJ25	Modesto	238	1	193	432
SJ26	Three Amigos	22	247	7	276
SJ27	Stanislaus South	45	133	8	186
SJ28	Stanislaus North	274	342	33	649
SJ29	Banta Carbona	121	125	2	248
SJ30	Paradise Cut	33	182	2	217
SJ31	Stewart Tract	0	2	0	2
SJ32	East Lathrop	24	3	16	43

Table 4-8. HEC-FDA Expected Annual Damages for San Joaquin River Basin and Stockton Area in 2010 October $1,000 – Protect High Risk Communities Approach (contd.)

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SJ33	Lathrop/Sharpe	169	1	10	180
SJ34	French Camp	0	0	0	0
SJ35	Moss Tract	0	0	0	0
SJ36	Roberts Island	126	625	6	756
SJ37	Rough and Ready Island	0	0	0	0
SJ38	Drexler Tract	18	68	6	92
SJ39	Union Island	21	76	4	101
SJ40	Union Island Toe	10	14	0	24
SJ41	Fabian Tract	3	14	0	17
SJ42	Reclamation District 1007	8	9	0	17
SJ43	Grayson	32	0	1	33
STK01	Lower Roberts Island	0	0	0	0
STK06	Stockton East	46	4	17	67
STK07	Calaveras River	15	0	0	15
STK08	Bear Creek South	27	0	0	27
STK09	Bear Creek North	22	0	0	22
STK10	Central Stockton	0	0	0	0
	Total	**3,553**	**14,684**	**582**	**18,819**

Key:
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis

Table 4-9. HEC-FDA Expected Annual Damages for Sacramento River Basin in 2010 October $1,000 – Enhance Flood System Capacity Approach

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SAC01	Woodson Bridge East	26	213	8	246
SAC02	Woodson Bridge West	4	9	0	13
SAC03	Hamilton City	492	0	34	526
SAC04	Capay	38	731	75	844
SAC05	Butte Basin	15	49	8	72
SAC06	Butte City	1	0	0	1
SAC07	Colusa Basin North	37	23	8	67
SAC08	Colusa	33	0	2	35
SAC09	Colusa Basin South	0	1	0	2
SAC10	Grimes	0	0	0	0
SAC11	Reclamation District 1500 West	5	10	2	17
SAC12	Sycamore Slough	0	27	0	28
SAC13	Knight's Landing	171	0	56	227
SAC14	Ridge Cut (North)	0	5	0	5
SAC15	Ridge Cut (South)	1.5	6	0	7
SAC16	Reclamation District 2035	7	7	0	15
SAC17	East of Davis	101	4	12	117
SAC18	Upper Honcut	7	10	0	18
SAC20	Gridley	168	2	2	172
SAC21	Sutter Buttes East	161	44	11	216
SAC22	Live Oak	245	1	10	255
SAC23	Lower Honcut	69	0	0	69
SAC24	Levee District No.1	0	0	0	0
SAC25	Yuba City	3,361	8	488	3,857
SAC26	Marysville	343	0	102	445
SAC27	Linda-Olivehurst	1,645	18	453	2,116
SAC28	Reclamation District 784	335	30	9	375
SAC29	Best Slough	105	43	7	155
SAC30	Reclamation District 1001	29	35	5	69
SAC32	Reclamation District 70-1660	2	3	1	6
SAC33	Meridian	1	0	0	1

Table 4-9. HEC-FDA Expected Annual Damages for Sacramento River Basin in 2010 October $1,000 – Enhance Flood System Capacity Approach (contd.)

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SAC34	Reclamation District 1500 East	16	15	14	46
SAC35	Elkhorn	16	91	1	108
SAC36	Natomas	2,086	8	641	2,735
SAC37	Rio Linda	1,434	1	809	2,244
SAC38	West Sacramento	1,356	0	597	1,954
SAC39	Reclamation District 900	452	1	15	469
SAC40	Sacramento North	5,410	0	3,101	8,511
SAC41	Reclamation District 302	6	0	0	6
SAC42	Reclamation District 999	47	57	1	105
SAC43	Clarksburg	2	0	0	3
SAC44	Stone Lake	308	4	10	321
SAC45	Hood	2	0	4	6
SAC46	Merritt Island	16	48	0	64
SAC47	Reclamation District 551	18	54	58	130
SAC48	Courtland	28	0	0	28
SAC49	Sutter Island	0	8	0	8
SAC50	Grand Island	29	27	12	69
SAC51	Locke	19	1	61	82
SAC52	Walnut Grove	2	0	1	3
SAC53	Tyler Island	0	1	0	2
SAC54	Andrus Island	120	55	74	248
SAC55	Ryer Island	1	2	0	3
SAC56	Prospect Island	1	2	1	4
SAC57	Twitchell Island	0	0	0	0
SAC58	Sherman Island	144	189	412	745
SAC59	Moore	17	15	0	32
SAC60	Cache Slough	15	14	0	29
SAC61	Hastings	3	12	0	15
SAC62	Lindsey Slough	3	6	0	8
SAC63	Sacramento South	20,620	1	9,338	29,959
	Total	**39,575**	**1,891**	**16,446**	**57,911**

Key:
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis

Table 4-10. HEC-FDA Expected Annual Damages for San Joaquin River Basin and Stockton Area in 2010 October $1,000 – Enhance Flood System Capacity Approach

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SJ01	Fresno	49	2	5	56
SJ02	Fresno Slough East	48	181	3	232
SJ03	Fresno Slough West	5	59	0	64
SJ04	Mendota	25	0	0	25
SJ05	Chowchilla Bypass	5	51	0	56
SJ06	Lone Willow Slough	74	304	0	378
SJ07	Mendota North	0	6	0	6
SJ08	Firebaugh	24	0	0	24
SJ09	Salt Slough	395	947	33	1,375
SJ10	Dos Palos	105	8	1	114
SJ11	Fresno River	1	36	0	37
SJ12	Berenda Slough	15	70	0	85
SJ13	Ash Slough	9	34	1	44
SJ14	Sandy Mush	3	8	0	12
SJ15	Turner Island	9	158	0	167
SJ16	Bear Creek	13	33	1	47
SJ17	Deep Slough	3	8	0	11
SJ18	West Bear Creek	1	1	0	2
SJ19	Fremont Ford	1	1	0	2
SJ20	Merced River	113	842	27	982
SJ21	Merced River North	0	0	0	0
SJ22	Orestimba	0	0	0	0
SJ23	Tuolumne South	44	152	5	202
SJ24	Tuolumne River	11	1	5	17
SJ25	Modesto	170	1	146	316
SJ26	Three Amigos	5	16	1	22
SJ27	Stanislaus South	8	11	1	20
SJ28	Stanislaus North	105	37	4	146
SJ29	Banta Carbona	92	16	1	110
SJ30	Paradise Cut	2	1	0	3
SJ31	Stewart Tract	0	0	0	0
SJ32	East Lathrop	14	2	10	27

Table 4-10. HEC-FDA Expected Annual Damages for San Joaquin River Basin and Stockton Area in 2010 October $1,000 – Enhance Flood System Capacity Approach (contd.)

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SJ33	Lathrop/Sharpe	231	1	12	244
SJ34	French Camp	0	4	0	4
SJ35	Moss Tract	0	0	0	0
SJ36	Roberts Island	5	16	0	22
SJ37	Rough and Ready Island	0	0	0	0
SJ38	Drexler Tract	1	73	7	81
SJ39	Union Island	14	58	3	75
SJ40	Union Island Toe	0	1	0	2
SJ41	Fabian Tract	2	11	0	13
SJ42	Reclamation District 1007	9	10	0	20
SJ43	Grayson	4	0	0	4
STK01	Lower Roberts Island	0	0	0	0
STK06	Stockton East	46	4	17	67
STK07	Calaveras River	15	0	0	15
STK08	Bear Creek South	27	0	0	27
STK09	Bear Creek North	22	0	0	22
STK10	Central Stockton	0	0	0	0
	Total	**1,726**	**3,165**	**285**	**5,176**

Key:
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis

Table 4-11. HEC-FDA Expected Annual Damages for Sacramento River Basin in 2010 October $1,000 – State Systemwide Investment Approach

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SAC01	Woodson Bridge East	26	213	8	246
SAC02	Woodson Bridge West	4	9	0	13
SAC03	Hamilton City	489	0	32	521
SAC04	Capay	37	729	74	840
SAC05	Butte Basin	252	2,403	198	2,854
SAC06	Butte City	6	0	0	6
SAC07	Colusa Basin North	65	65	18	149
SAC08	Colusa	61	1	5	66
SAC09	Colusa Basin South	143	453	49	644
SAC10	Grimes	7	1	0	8
SAC11	Reclamation District 1500 West	64	101	33	198
SAC12	Sycamore Slough	0	27	0	28
SAC13	Knight's Landing	382	2	203	586
SAC14	Ridge Cut (North)	1	25	0	26
SAC15	Ridge Cut (South)	10	79	0	89
SAC16	Reclamation District 2035	11	267	1	280
SAC17	East of Davis	62	2	7	72
SAC18	Upper Honcut	26	61	0	88
SAC20	Gridley	345	8	6	359
SAC21	Sutter Buttes East	481	211	28	720
SAC22	Live Oak	807	3	25	835
SAC23	Lower Honcut	136	118	46	299
SAC24	Levee District No.1	296	0	25	321
SAC25	Yuba City	3,480	8	512	4,000
SAC26	Marysville	298	0	88	386
SAC27	Linda-Olivehurst	1,657	18	462	2,137
SAC28	Reclamation District 784	706	73	21	800
SAC29	Best Slough	388	323	29	740
SAC30	Reclamation District 1001	306	1,380	29	1,715
SAC32	Reclamation District 70-1660	226	640	159	1,025
SAC33	Meridian	200	3	84	286

Table 4-11. HEC-FDA Expected Annual Damages for Sacramento River Basin in 2010 October $1,000 – State Systemwide Investment Approach (contd.)

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SAC34	Reclamation District 1500 East	121	360	152	633
SAC35	Elkhorn	99	1,387	6	1,491
SAC36	Natomas	3,966	16	1,287	5,269
SAC37	Rio Linda	1,796	1	1,076	2,874
SAC38	West Sacramento	2,165	0	997	3,162
SAC39	Reclamation District 900	654	2	23	679
SAC40	Sacramento North	5,496	0	3,105	8,601
SAC41	Reclamation District 302	21	71	1	93
SAC42	Reclamation District 999	84	109	2	195
SAC43	Clarksburg	59	0	14	73
SAC44	Stone Lake	224	7	15	246
SAC45	Hood	3	0	7	10
SAC46	Merritt Island	55	84	0	139
SAC47	Reclamation District 551	156	912	526	1,594
SAC48	Courtland	247	3	228	479
SAC49	Sutter Island	15	620	0	635
SAC50	Grand Island	457	1,279	224	1,959
SAC51	Locke	16	3	37	56
SAC52	Walnut Grove	13	0	5	18
SAC53	Tyler Island	86	358	88	532
SAC54	Andrus Island	63	172	58	293
SAC55	Ryer Island	76	486	0	562
SAC56	Prospect Island	13	105	20	137
SAC57	Twitchell Island	0	0	0	0
SAC58	Sherman Island	166	210	508	884
SAC59	Moore	34	84	0	118
SAC60	Cache Slough	3	9	0	12
SAC61	Hastings	16	96	0	112
SAC62	Lindsey Slough	49	191	0	240
SAC63	Sacramento South	27,371	2	12,525	39,897
	Total	**54,497**	**13,791**	**23,044**	**91,332**

Key:
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis

Table 4-12. HEC-FDA Expected Annual Damages for San Joaquin River Basin and Stockton Area in 2010 October $1,000 – State Systemwide Investment Approach

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SJ01	Fresno	76	3	7	86
SJ02	Fresno Slough East	94	364	5	463
SJ03	Fresno Slough West	6	80	0	86
SJ04	Mendota	27	0	0	28
SJ05	Chowchilla Bypass	41	728	0	769
SJ06	Lone Willow Slough	15	464	0	479
SJ07	Mendota North	1	10	0	10
SJ08	Firebaugh	24	0	0	24
SJ09	Salt Slough	899	2,062	83	3,044
SJ10	Dos Palos	235	18	4	256
SJ11	Fresno River	7	489	0	496
SJ12	Berenda Slough	271	3,436	10	3,716
SJ13	Ash Slough	25	724	6	754
SJ14	Sandy Mush	12	429	1	442
SJ15	Turner Island	46	2,500	0	2,546
SJ16	Bear Creek	12	29	1	42
SJ17	Deep Slough	6	27	0	33
SJ18	West Bear Creek	31	91	7	129
SJ19	Fremont Ford	3	4	0	8
SJ20	Merced River	142	842	27	1,011
SJ21	Merced River North	87	219	72	378
SJ22	Orestimba	24	31	13	69
SJ23	Tuolumne South	71	278	9	357
SJ24	Tuolumne River	147	9	30	186
SJ25	Modesto	238	1	193	432
SJ26	Three Amigos	22	247	7	276
SJ27	Stanislaus South	45	133	8	186
SJ28	Stanislaus North	274	342	33	649
SJ29	Banta Carbona	121	125	2	248
SJ30	Paradise Cut	33	182	2	217
SJ31	Stewart Tract	0	2	0	2
SJ32	East Lathrop	24	3	16	43

Table 4-12. HEC-FDA Expected Annual Damages for the San Joaquin River Basin and Stockton Area in 2010 October $1,000 – State Systemwide Investment Approach (contd.)

Damage Area	Description	Structure and Contents	Crop	Business Loss	Total
SJ33	Lathrop/Sharpe	169	1	10	180
SJ34	French Camp	0	0	0	0
SJ35	Moss Tract	0	0	0	0
SJ36	Roberts Island	126	625	6	757
SJ37	Rough and Ready Island	0	0	0	0
SJ38	Drexler Tract	19	70	6	95
SJ39	Union Island	21	73	4	98
SJ40	Union Island Toe	10	14	0	24
SJ41	Fabian Tract	3	14	0	17
SJ42	Reclamation District 1007	8	9	0	17
SJ43	Grayson	32	0	1	33
STK01	Lower Roberts Island	0	0	0	0
STK06	Stockton East	46	4	17	67
STK07	Calaveras River	15	0	0	15
STK08	Bear Creek South	27	0	0	27
STK09	Bear Creek North	22	0	0	22
STK10	Central Stockton	0	0	0	0
	Total	**3,554**	**14,683**	**582**	**18,819**

Key:
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis

4.6 Structures and Population at Risk

Structures and population at risk were determined for both river basins.

4.6.1 Structures at Risk

HAZUS-MH is a computer program developed by FEMA, under contract with the National Institute of Building Sciences, to assess potential losses from floods, hurricane winds, and earthquakes. HAZUS-MH comes bundled with a wide range of spatial and tabular data and uses GIS software (ArcGIS), to map and display hazard data. Figure 4-1 and Table 4-13 summarize core data from HAZUS-MH regarding at-risk structures inside the Systemwide Planning Area that CVFPP could apply to evaluate emergency cost. There are 2,861 at-risk facilities in the Systemwide Planning Area, including more than 1,500 highway bridges and about 700 schools, also, there are 1,847 miles of transportation segments in the Systemwide Planning Area; two-thirds are highways (FEMA, 2010).

In Figure 4-1, the following definitions of at-risk facilities are used:

- Transportation – airports, bus stations, ferries, highway bridges, light rail facilities, port facilities, railway facilities, railway bridges, and runway facilities
- High Potential Loss – dams and facilities with hazardous materials
- Emergency Facilities – care facilities, emergency centers, fire stations, police stations, and schools
- Utilities – telecommunication facilities, electric power facilities, oil facilities, potable water facilities, and wastewater treatment facilities

4.6.2 Population at Risk

Using the 2000 Census population data in HAZUS-MH, census blocks inside the Systemwide Planning Area were first identified; then, population in the Systemwide Planning Area was prorated based on block area inside the Systemwide Planning Area (U.S. Census Bureau, 2000). It was estimated that the total population inside the Systemwide Planning Area is 1,525,142. The same approach was applied to estimate the population inside each CVFPP HEC-FDA damage area; these numbers are summarized in Table 4-14 for the Sacramento River Basin and Table 4-15 for the San Joaquin River Basin (FEMA, 2010).

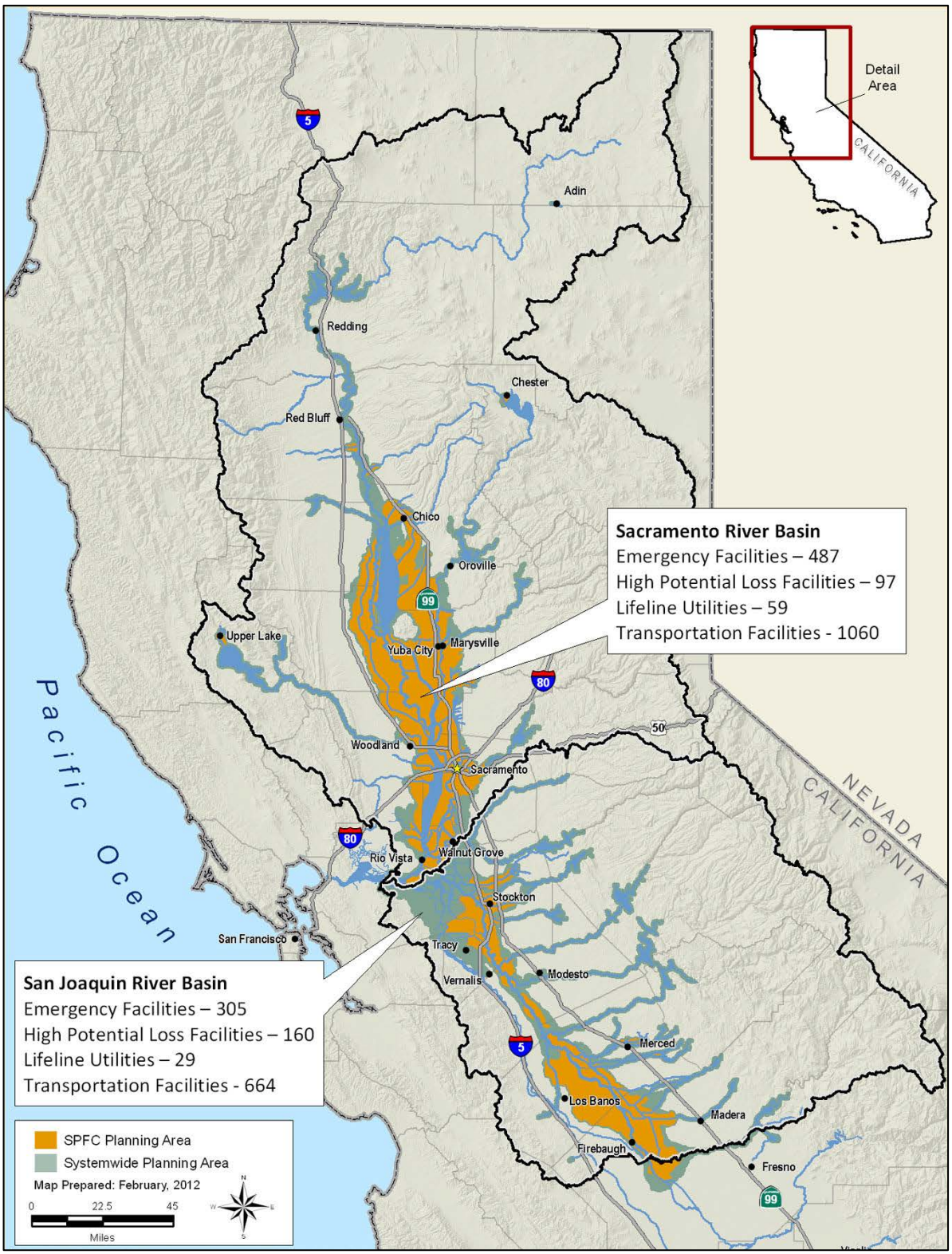

Figure 4-1. At-Risk Facilities in the Systemwide Planning Area

In the Sacramento River Basin, SAC63 (Sacramento South) has the largest population (413,736), followed by SAC40 (Sacramento North – 60,314) and SAC25 (Yuba City – 58,020). In the San Joaquin River Basin, STK10 (Central Stockton) has the largest population of 124,857, followed by STK07 (Calaveras River) – 52,026, STK08 (Bear Creek South) – 37,058, SJ25 (Modesto) – 16,344, SJ34 (French Camp – 13,245), SJ35 (Moss Tract – 10,501), and SJ33 (Lathrop/Sharpe – 10,342).

Table 4-13. Lengths of At-Risk Transportation Segments Inside Systemwide Planning Area

Segments	Total Miles
Highway	1,270
Light Rail	39
Railway	537
Total	**1,846**

Table 4-14. Population for CVFPP HEC-FDA Damage Areas – Sacramento River Basin

Damage Area	Description	Population	Damage Area	Description	Population
SAC01	Woodson Bridge East	714	SAC33	Meridian	214
SAC02	Woodson Bridge West	129	SAC34	RD 1500 East	329
SAC03	Hamilton City	2,068	SAC35	Elkhorn	170
SAC04	Capay	140	SAC36	Natomas	41,141
SAC05	Butte Basin	755	SAC37	Rio Linda	26,173
SAC06	Butte City	55	SAC38	West Sacramento	25,605
SAC07	Colusa Basin North	1,616	SAC39	RD 900	6,018
SAC08	Colusa	5,933	SAC40	Sacramento North	60,314
SAC09	Colusa Basin South	1,286	SAC41	RD 302	144
SAC10	Grimes	292	SAC42	RD 999	751
SAC11	RD 1500 West	578	SAC43	Clarksburg	292
SAC12	Sycamore Slough	64	SAC44	Stone Lake	39,386
SAC13	Knight's Landing	951	SAC45	Hood	182
SAC14	Ridge Cut (North)	156	SAC46	Merritt Island	214
SAC15	Ridge Cut (South)	65	SAC47	RD 551	597
SAC16	RD 2035	205	SAC48	Courtland	70
SAC17	East of Davis	1,785	SAC49	Sutter Island	121
SAC18	Upper Honcut	719	SAC50	Grand Island	1,174
SAC20	Gridley	6,859	SAC51	Locke	149
SAC21	Sutter Buttes East	5,465	SAC52	Walnut Grove	471
SAC22	Live Oak	6,328	SAC53	Tyler Island	62
SAC23	Lower Honcut	1,323	SAC54	Andrus Island	1,824
SAC24	Levee District. No.1	4,109	SAC55	Ryer Island	287
SAC25	Yuba City	58,020	SAC56	Prospect Island	2
SAC26	Marysville	12,320	SAC57	Twitchell Island	112
SAC27	Linda-Olivehurst	25,516	SAC58	Sherman Island	182
SAC28	RD 784	1,062	SAC59	Moore	140
SAC29	Best Slough	361	SAC60	Cache Slough	84
SAC30	RD 1001	1,272	SAC61	Hastings	48
SAC32	RD 70-1660	495	SAC62	Lindsey Slough	1,087
			SAC63	Sacramento South	413,736
				Grand Total Population =	761,717

Source: FEMA, 2010
Key:
CVFPP = Central Valley Flood Protection Plan
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis
RD = Reclamation District

Table 4-15. Population for CVFPP HEC-FDA Damage Areas – San Joaquin River Basin, Including Stockton Area

Damage Area	Description	Population	Damage Area	Description	Population
SJ01	Fresno	2,624	SJ26	Three Amigos	569
SJ02	Fresno Slough East	782	SJ27	Stanislaus South	156
SJ03	Fresno Slough West	58	SJ28	Stanislaus North	1,794
SJ04	Mendota	1,918	SJ29	Banta Carbona	4,840
SJ05	Chowchilla Bypass	359	SJ30	Paradise Cut	622
SJ06	Lone Willow Slough	812	SJ31	Stewart Tract	199
SJ07	Mendota North	71	SJ32	East Lathrop	333
SJ08	Firebaugh	6,181	SJ33	Lathrop/Sharpe	10,342
SJ09	Salt Slough	4,093	SJ34	French Camp	13,245
SJ10	Dos Palos	5,528	SJ35	Moss Tract	10,501
SJ11	Fresno River	66	SJ36	Roberts Island	488
SJ12	Berenda Slough	874	SJ37	Rough and Ready Island	1
SJ13	Ash Slough	359	SJ38	Drexler Tract	64
SJ14	Sandy Mush	11	SJ39	Union Island	519
SJ15	Turner Island	95	SJ40	Union Island Toe	12
SJ16	Bear Creek	257	SJ41	Fabian Tract	172
SJ17	Deep Slough	4	SJ42	RD 1007	1,066
SJ18	West Bear Creek	7	SJ43	Grayson	661
SJ19	Fremont Ford	846	STK01	Lower Roberts Island	321
SJ20	Merced River	830	STK06	Stockton East	465
SJ21	Merced River North	1,170	STK07	Calaveras River	52,026
SJ22	Orestimba	902	STK08	Bear Creek South	37,058
SJ23	Tuolumne South	414	STK09	Bear Creek North	4,220
SJ24	Tuolumne River	2,799	STK10	Central Stockton	124,857
SJ25	Modesto	16,344			
				Grand total population = 311,933	

Source: FEMA, 2010

Key:
CVFPP = Central Valley Flood Protection Plan
HEC-FDA = Hydrologic Engineering Center Flood Damage Analysis
RD = Reclamation District

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WRC. *See* U.S. Water Resources Council.

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6.0 Acronyms and Abbreviations

AEP	annual exceedence probability
Ag damage spreadsheet	Comprehensive Study Agricultural Damage Spreadsheet
APN	Assessor Parcel Number
Board	The Reclamation Board or Central Valley Flood Protection Board
Breach	levee failure
CDFA	California Department of Food and Agriculture
cfs	cubic feet per second
Comprehensive Study	Sacramento and San Joaquin River Basins Comprehensive Study
CPI	Consumer Price Index
CVFPP	Central Valley Flood Protection Plan
DDF	depth-damage function
Delta	Sacramento-San Joaquin Delta
DWR	California Department of Water Resources
EAD	expected annual damages
EFSC	Enhance Flood System Capacity
EIA	Energy Information Administration
FEMA	Federal Emergency Management Agency
FloodSAFE	DWR FloodSAFE California
F-RAM	Flood Rapid Assessment Model
GIS	geographic information system
HEC-FDA	Hydrologic Engineering Center Flood Damage Analysis
HEC-RAS	Hydrologic Engineering Center River Analysis System
IMPLAN	IMPact Analysis for PLANning
LFPZ	Levee Flood Protection Zones
NED	national economic development
NFIP	National Flood Insurance Program

NRCS	Natural Resources Conservation Service
NULE	Non-Urban Levee Evaluation
OES	State Office of Emergency Services
P&G	Principles and Guidelines
PHRC	Protect High Risk Communities
RD	Reclamation District
Reclamation	U.S. Department of Interior, Bureau of Reclamation
SAFCA	Sacramento Area Flood Control Agency
SJAFCA	San Joaquin Area Flood Control Agency
SPFC	State Plan of Flood Control
SSIA	State Systemwide Investment Approach
Stage	maximum water surface elevation
State	State of California
TRLIA	Three Rivers Levee Improvement Authority
UC Davis	University of California, Davis
ULE	Urban Levee Evaluation
UNET	Unsteady flow through a NETwork of open channels
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture

CENTRAL VALLEY FLOOD MANAGEMENT PLANNING PROGRAM

FloodSAFE CALIFORNIA

2012 Central Valley Flood Protection Plan

Attachment 8F: Flood Damage Analysis Appendix A – County Land Use Codes

June 2012

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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Table A-1. Butte County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
00	Valid 0 value	Misc	MISC	Miscellaneous
99	No Definition available	Misc	MISC	Miscellaneous
9999	No Definition available	Misc	MISC	Miscellaneous
AA	Almonds	CROP	CROP	Crops
AB	Mixed nuts	CROP	CROP	Crops
AC	Citrus	CROP	CROP	Crops
AD	Dry farming	CROP	CROP	Crops
AE	Pears	CROP	CROP	Crops
AF	Field and Row crops	CROP	CROP	Crops
AG	Grazing	CROP	CROP	Crops
AI	Irrigated pasture	CROP	CROP	Crops
AJ	Peaches	CROP	CROP	Crops
AK	Kiwis	CROP	CROP	Crops
AM	Mixed fruit crops	CROP	CROP	Crops
AN	Mixed fruit/nut crops	CROP	CROP	Crops
AO	Olives	CROP	CROP	Crops
AP	Prunes	CROP	CROP	Crops
AQ	Christmas trees	CROP	CROP	Crops
AR	Rice	CROP	CROP	Crops
AT	Timber	CROP	CROP	Crops
AU	Pistachios	CROP	CROP	Crops
AV	Vines	CROP	CROP	Crops
AW	Walnuts	CROP	CROP	Crops
AY	Mixed agricultural	CROP	CROP	Crops
AZ	Miscellaneous	CROP	CROP	Crops
CC	Service (garage, shop, mini-mart)	COM	C-SERV	Commercial Service-Auto
CI	Institutional (church, hospital)	COM	C-HOS	Hospital
CP	Commercial/professional (bank, etc.)	COM	C-RET	Commercial Retail
CR	Residential (motel, hotel, mobile home park)	COM	C-HOTEL	Hotel
CS	Commercial retail (stores, etc.)	COM	C-RET	Commercial Retail
CT	Recreational (theatre, golf, etc.)	PUB	P-REC	Public Recreation/Assembly
CU	Utilities	PUB	P-GOV	Public Government Building
CV	Commercial vacant	Misc	MISC	Miscellaneous
CZ	Miscellaneous commercial	COM	MISC-COM	Miscellaneous Commercial

Table A-1. Butte County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
IM	Manufacturing	IND	I-HV	Industrial Heavy Manufacture
IV	Industrial vacant	Misc	MISC	Miscellaneous
IW	Warehouse/wholesale operations	IND	I-WH	Industrial Warehouse
IZ	Miscellaneous industrial	IND	MISC-IND	Miscellaneous Industrial
MZ	Timber, oil, and gas rights	Misc	MISC	Miscellaneous
R2	Duplex	MFR	MFR	Multi-Family Residential
R3	Triplex	MFR	MFR	Multi-Family Residential
R4	Fourplex	MFR	MFR	Multi-Family Residential
R7	Multiple residential, not matching	MFR	MFR	Multi-Family Residential
RA	Five or more units - apartments	MFR	MFR	Multi-Family Residential
RC	Condominium	MFR	MFR	Multi-Family Residential
RM	Single-family dwelling - property tax mobile home	MH	MH	Mobile Home Single/Double
RN	Single-family dwelling - license fee mobile home	MH	MH	Mobile Home Single/Double
RP	Permanent foundation mobile home	MH	MH	Mobile Home Single/Double
RQ	Single-family dwelling - mobile home UNK STAT	MH	MH	Mobile Home Single/Double
RS	Single-family dwelling - stick built	SFR	SFR	Single-family Residential W/Basement
RV	Vacant	Misc	MISC	Miscellaneous
RW	Modular	COM	C-SHOP	Commercial Shopping Center
RZ	Miscellaneous	FARM	FARM	Farm Buildings Including Primary RES
UU	Not usable (ditches, etc.)	Misc	MISC	Miscellaneous

Table A-2. Colusa County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
A	Agriculture	CROP	CROP	Crops
A=	No Definition Available	Misc	MISC	Miscellaneous
A9	Special Agriculture	CROP	CROP	Crops
AA	Agriculture: Agriculture Services	CROP	CROP	Crops
AD	Diversified agricultural (irrigated)	CROP	CROP	Crops
AK	Dry Farm	CROP	CROP	Crops
AL	Livestock (grazing)	CROP	CROP	Crops
AO	Orchard	CROP	CROP	Crops
AR	Rice	CROP	CROP	Crops
AT	Grain storage drying	IND	I-LT	Industrial Light
AV	Vacant	Misc	MISC	Miscellaneous
AW	Waste	Misc	MISC	Miscellaneous
AY	Duck club	PUB	P-REC	Public Recreation/Assembly
C	Commercial	COM	C-OFF	Commercial Office
C3	Triplex	COM	C-OFF	Commercial Office
C9	Special – all others	COM	MISC-COM	Miscellaneous Commercial
CA	Agricultural service	FARM	FARM	Farm Buildings Including Primary RES
CB	Financial	COM	C-RET	Commercial Retail
CD	Diversified agricultural (irrigated)	CROP	CROP	Crops
CE	Retail outlet	COM	C-RET	Commercial Retail
CF	Food service (bar, restaurant, etc.)	COM	C-RESTFF	Commercial Fast Food Rest
CG	Golf course	PUB	P-REC	Public Recreation/Assembly
CH	Hotel/motel	COM	C-HOTEL	Hotel
CI	Auto sales	COM	C-DEAL	Full Service Auto Dealership
CJ	Garage and service station	COM	C-SERV	Commercial Service-Auto
CM	Medical	COM	C-MED	Commercial Medical
CN	Diversified commercial	COM	MISC-COM	Miscellaneous Commercial
CP	Petroleum wholesale	IND	I-WH	Industrial Warehouse
CT	Grain storage drying	IND	I-WH	Industrial Warehouse
CU	Mobilehome park	MH	MH	Mobile Home Single/Double
CV	Vacant	Misc	MISC	Miscellaneous
CW	Waste	COM	MISC-COM	Miscellaneous Commercial
CX	Dairy	IND	I-LT	Industrial Light
CY	Duck club	PUB	P-REC	Public Recreation/Assembly
CZ	Office	COM	C-OFF	Commercial Office
ER	Easement – Rice	CROP	CROP	Crops
EV	Easement – Vacant	Misc	MISC	Miscellaneous

Table A-2. Colusa County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
EW	Easement – Waste	Misc	MISC	Miscellaneous
EY	Easement – Duck club	PUB	P-GOV	Public Government Building
A	Agriculture	CROP	CROP	Crops
A=	No Definition Available	Misc	MISC	Miscellaneous
A9	Special Agriculture	CROP	CROP	Crops
AA	Agriculture: Agriculture Services	CROP	CROP	Crops
AD	Diversified agricultural (irrigated)	CROP	CROP	Crops
AK	Dry Farm	CROP	CROP	Crops
AL	Livestock (grazing)	CROP	CROP	Crops
AO	Orchard	CROP	CROP	Crops
AR	Rice	CROP	CROP	Crops
AT	Grain storage drying	IND	I-LT	Industrial Light
AV	Vacant	Misc	MISC	Miscellaneous
AW	Waste	Misc	MISC	Miscellaneous
G	Government	PUB	P-GOV	Public Government Building
G9	Government – Special	PUB	P-GOV	Public Government Building
GA	Government – Agricultural service	PUB	P-GOV	Public Government Building
GD	Government – Diversified agricultural (irrigated)	PUB	P-GOV	Public Government Building
GF	Government – Food service	PUB	P-GOV	Public Government Building
GN	Government – Diversified commercial	PUB	P-GOV	Public Government Building
GQ	Government – Quarry	PUB	P-GOV	Public Government Building
GS	Government – School	PUB	P-GOV	Public Government Building
GV	Government – Vacant	Misc	MISC	Miscellaneous
GW	Government – Waste	PUB	MISC-PUB	Miscellaneous Public/Gov
GZ	Government – Office	PUB	P-GOV	Public Government Building
I9	Special - all others	IND	MISC-IND	Miscellaneous Industrial
IA	Agricultural service	IND	I-LT	Industrial Light
IT	Grain storage drying	IND	I-LT	Industrial Light
IV	Vacant	Misc	MISC	Miscellaneous
IW	Industrial Waste	IND	I-LT	Industrial Light
NG	Recreational – Golf course	PUB	P-REC	Public Recreation/Assembly
NV	Recreational – Vacant	Misc	MISC	Miscellaneous
PM	Professional – Medical	COM	C-MED	Commercial Medical
PZ	Professional – Medical	COM	C-MED	Commercial Medical
R	Residential	SFR	SFR	Single-family Residential
R1	Single-family residence	SFR	SFR	Single-family Residential
R2	Duplex	MFR	MFR	Multi-Family Residential

Table A-2. Colusa County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
R3	Triplex	MFR	MFR	Multi-Family Residential
R4	Multiple (4 or more)	MFR	MFR	Multi-Family Residential
R5	Multiple single	MFR	MFR	Multi-Family Residential
R6	Mobilehome site	MH	MH	Mobile Home Single/Double
R7	Combination mobilehome/residential	MH	MH	Mobile Home Single/Double
R9	Special - all others	SFR	MISC-RES	Miscellaneous Residential
RI	Auto sales	COM	C-AUTO	Commercial Auto Sales
RM	Medical	COM	C-MED	Commercial Medical
RU	Mobilehome park	MH	MH	Mobile Home Single/Double
RV	Vacant	Misc	MISC	Miscellaneous
RW	Waste	SFR	MISC-RES	Miscellaneous Residential
W1	Williamson Act – Single-family residence	SFR	SFR	Single-family Residential
WD	Williamson Act – Diversified agricultural	CROP	MISC-AG	Miscellaneous Agriculture
WK	Williamson Act – Dry Farm	CROP	MISC-AG	Miscellaneous Agriculture
WL	Williamson Act – Livestock	FARM	MISC-FARM	Miscellaneous Farm
WLE	Williamson Act – Livestock – Retail outlet	FARM	MISC-FARM	Miscellaneous Farm
WO	Williamson Act – Orchard	CROP	MISC-AG	Miscellaneous Agriculture
WR	Williamson Act – Rice	CROP	MISC-AG	Miscellaneous Agriculture
WW	Williamson Act – Waste	CROP	MISC-AG	Miscellaneous Agriculture
WY	Williamson Act – Duck club	PUB	MISC-PUB	Miscellaneous Public/Gov
XD	Unknown	Misc	MISC	Miscellaneous
XK	Unknown	Misc	MISC	Miscellaneous
XO	Unknown	Misc	MISC	Miscellaneous
XR	Unknown	Misc	MISC	Miscellaneous
Y9	Institutional – Special	PUB	MISC-PUB	Miscellaneous Public/Gov
YA	Institutional – Agricultural service	PUB	P-GOV	Public Government Building
YC	Institutional – Church	PUB	P-CH	Public Church
YR	Institutional – Rice	IND	I-WH	Industrial Warehouse
YS	Institutional – School	PUB	P-SCH	Public and Private Schools

Table A-3. Contra Costa County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
10	Vacant, unbuildable	MISC	Misc	Miscellaneous
11	Single-family, 1 residential on 1 Site and Duets w/o common areas	SFR	SFR	Single-family Residential
12	Single-family, 1 residential on 2 or more sites	MFR	MFR	Multi-Family Residential
13	Single-family, 2 or more residential on 1 or more sites	MFR	MFR	Multi-Family Residential
14	Single-family on other than single-family land	MFR	MFR	Multi-Family Residential
15	Miscellaneous improvements, 1 site	MISC-RES	SFR	Miscellaneous Residential
16	Misc. improvements on 2 or more sites; includes trees and vines	MISC-RES	SFR	Miscellaneous Residential
17	Vacant, 1 site (includes PUD sites)	MISC	Misc	Miscellaneous
18	Vacant, 2 or more sites	MISC	Misc	Miscellaneous
19	Single-family residential, detached, w/common area (normal Subdivision type PUD); duets w/common area	SFR	SFR	Single-family Residential
20	Vacant	MISC	Misc	Miscellaneous
21	Duplex	MFR	MFR	Multi-Family Residential
22	Triplex	MFR	MFR	Multi-Family Residential
23	Fourplex	MFR	MFR	Multi-Family Residential
24	Combinations (e.g., single and a double)	MFR	MFR	Multi-Family Residential
25	Apartments, 5-12 units, inclusive	MFR	MFR	Multi-Family Residential
26	Apartments, 13-24 units, inclusive	MFR	MFR	Multi-Family Residential
27	Apartments, 25-59 units, inclusive	MFR	MFR	Multi-Family Residential
28	Apartments, 60 units or more	MFR	MFR	Multi-Family Residential
29	Attached PUDs, cluster homes, co-ops, condos, townhouses, etc.	MFR	MFR	Multi-Family Residential
30	Vacant	MISC	Misc	Miscellaneous
31	Commercial stores (not supermarkets)	C-RET	COM	Commercial Retail
32	Small grocery stores (7-11, mom and pop, quick-stop)	C-FOOD	COM	Commercial Food-Retail
33	Office buildings	C-OFF	COM	Commercial Office
34	Medical; dental	C-MED	COM	Commercial Medical
35	Service stations; car washes; bulk plants	C-SERV	COM	Commercial Service-Auto
36	Garages	C-SERV	COM	Commercial Service-Auto

Table A-3. Contra Costa County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
37	Community facilities; recreational; swim pool association	P-REC	PUB	Public Recreation/Assembly
38	Golf courses	P-REC	PUB	Public Recreation/Assembly
39	Bowling alleys	P-REC	PUB	Public Recreation/Assembly
40	Boat Harbors	P-REC	PUB	Public Recreation/Assembly
41	Supermarkets (not in shopping centers)	C-RET	COM	Commercial Retail
42	Shopping centers (all parcels include vacant for future shopping Center	C-SHOP	COM	Commercial Shopping Center
43	Financial buildings (insurance and title companies, banks, savings and loans)	C-RET	COM	Commercial Retail
44	Motels, hotels, and mobile home parks	C-HOTEL	COM	Hotel
45	Theaters	P-REC	PUB	Public Recreation/Assembly
46	Drive-in restaurants (hamburger, taco, etc.)	C-REST	COM	Commercial Restaurants
47	Restaurants (not drive-in; inside service only)	C-REST	COM	Commercial Restaurants
48	Multiple and commercial; miscellaneously improved	MISC-COM	COM	Miscellaneous Commercial
49	New car auto agencies	C-AUTO	COM	Commercial Auto Sales
50	Vacant Land (not part of industrial park or P. and D.)	MISC	Misc	Miscellaneous
51	Industrial Park (with or without structures)	I-WH	IND	Industrial Warehouse
52	Research and Development, with or without structures	I-LT	IND	Industrial Light
53	Light industrial	I-LT	IND	Industrial Light
54	Heavy industrial	I-HV	IND	Industrial Heavy Manufacture
55	Mini-warehouse (public storage)	I-WH	IND	Industrial Warehouse
56	Miscellaneous improvements, including T & Von light or heavy industrial	I-HV	IND	Industrial Heavy Manufacture
61	Rural, residential improved; 1 to 10 acres	FARM	FARM	Farm Buildings Including Primary RES
62	Rural, with or without miscellaneous structures, 1 to 10 acres	FARM	FARM	Farm Buildings Including Primary RES
63	Urban acreage, 10 to 40 acres	MISC	Misc	Miscellaneous
64	Urban acreage, more than 40 acres	MISC	Misc	Miscellaneous

Table A-3. Contra Costa County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
65	Orchards, vineyards, row crops, irrigated pastures, 10 to 40 acres	CROP	CROP	Crops
66	Orchards, vineyards, row crops, irrigated pastures, over 40 acres	CROP	CROP	Crops
67	Dry farming, grazing and pasturing, 10 to 40 acres	MISC	Misc	Miscellaneous
68	Dry farming, grazing and pasturing, over 40 acres	MISC	Misc	Miscellaneous
69	Agricultural preserves	MISC	Misc	Miscellaneous
70	Convalescent hospitals and rest homes	C-HOS	COM	Hospital
71	Churches	P-CH	PUB	Public Church
72	Schools, public or private, with or without improvements	P-SCH	PUB	Public and Private Schools
73	Hospitals, with or without improvements	C-HOS	COM	Hospital
74	Cemeteries, mortuaries	MISC	Misc	Miscellaneous
75	Fraternal and service organizations	P-REC	PUB	Public Recreation/Assembly
76	Retirement housing complex	MFR	MFR	Multi-Family Residential
77	Cultural uses (libraries)	P-REC	PUB	Public Recreation/Assembly
78	Parks and playgrounds	P-REC	PUB	Public Recreation/Assembly
79	Government-owned, with or without buildings (federal, state, city, BART)	P-GOV	PUB	Public Government Building
81	Private roads	MISC	Misc	Miscellaneous
82	Pipelines and canals	MISC	Misc	Miscellaneous
83	State board assessed parcels	MISC-PUB	PUB	Miscellaneous Public/Gov
84	Utilities, with or without buildings (not assessed by SBE)	MISC-PUB	PUB	Miscellaneous Public/Gov
85	Public and private parking	MISC	Misc	Miscellaneous
86	Taxable municipally-owned property	MISC-PUB	PUB	Miscellaneous Public/Gov
87	Common area parcels in PUDs (open spaces, recreational facilities)	MISC-PUB	PUB	Miscellaneous Public/Gov
89	Other; split parcels in different Tax Code Areas	MISC	Misc	Miscellaneous

Table A-4. Fresno County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
A*******		FARM	FARM	Farm Buildings Including Primary RES
C000***	Vacant	C-RET	COM	Commercial Retail
CA*****	Apartment	MFR	MFR	Multi-Family Residential
CALM000	Almonds	CROP	CROP	Crops
CASC***	Auto Service and New Car Sales	C-AUTO	COM	Commercial Auto Sales
CBOA***	Bowling Alleys	P-REC	PUB	Public Recreation/Assembly
CC*****	Condominium	MFR	MFR	Multi-Family Residential
CCAW***	Car Wash	C-SERV	COM	Commercial Service-Auto
CCHU***	Churches	P-CH	PUB	Public Church
CCLH***	Club House	P-REC	PUB	Public Recreation/Assembly
CCOH***	Convalescent Hospital	C-HOS	COM	Hospital
CCOS***	Cold Storage and Slaughter Houses	I-WH	IND	Industrial Warehouse
CCS****	Commercial Stores	C-RET	COM	Commercial Retail
CDES***	Department Store	C-SHOP	COM	Commercial Shopping Center
CDIH***	Discount House	C-SHOP	COM	Commercial Shopping Center
CFAC***	Factory	I-LT	IND	Industrial Light
CFIE***	Field Cropland	CROP	CROP	Crops
CFIG***	Figs	CROP	CROP	Crops
CFII***	Banks / (FI)nancial (I)nstitutions	C-OFF	COM	Commercial Office
CFRL***	Fraternal Lodge	MFR	MFR	Multi-Family Residential
CFUH***	Funeral Home	C-MED	COM	Commercial Medical
CG01***	Unknown	C-OFF	COM	Commercial Office
CGAR***	Garages	C-SERV	COM	Commercial Service-Auto
CGO****	General Office	C-OFF	COM	Commercial Office
CGOC***	Golf Course	P-REC	PUB	Public Recreation/Assembly
CGRASM1	Granary and Rice Mills	I-WH	IND	Industrial Warehouse
CH*****	Hotel	C-HOTEL	COM	Hotel
CHOH***	Hot House	FARM	FARM	Farm Buildings Including Primary RES
CHOS***	Hospital	C-MED	COM	Commercial Medical
CLII***	Light Industrial	I-LT	IND	Industrial Light
CLIM***	Light Manufacturing	I-LT	IND	Industrial Light
CLUY***	Lumber Yard	I-LT	IND	Industrial Light
CM01***	Motel	C-HOTEL	COM	Hotel
CMD1***	Medical-Dental Office	C-MED	COM	Commercial Medical

Table A-4. Fresno County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
CMH1***	Manufactured Home on Permanent Foundation	SFR	SFR	Single-family Residential
CMNS***	Mini Storage	I-WH	IND	Industrial Warehouse
CNUR***	Nurseries (Plants)	C-RET	COM	Commercial Retail
COIL***	Oil and Gas "C" is Bulk Plant	I-HV	IND	Industrial Heavy Manufacture
COM1***	Only Manufactured Home	MH	MH	Mobile Home Single/Double
COUTLOT	Outlot	CROP	CROP	Crops
CPAH***	Packing House	I-WH	IND	Industrial Warehouse
CPAS***	Pasture - Native	CROP	CROP	Crops
CPCI***	Partially completed improvements	C-RET	COM	Commercial Retail
CPLU***	Plums	CROP	CROP	Crops
CPND***	Ponding Basins	CROP	CROP	Crops
CPOS***	Potential Subdivision (Primary)	C-RET	COM	Commercial Retail
CPOUGO1	Poultry	FARM	FARM	Farm Buildings Including Primary RES
CPSL***	Parking/Sales Lot (used cars)	C-AUTO	COM	Commercial Auto Sales
CPUB***	Publicly Owned	GOV	PUB	Government Administrative
CREC***	Recreation	P-REC	PUB	Public Recreation/Assembly
CRES***	Restaurant	C-FOOD	COM	Commercial Food-Retail
CS*****	Single-family Residential	SFR	SFR	Single-family Residential
CSCCSCC	Shopping Center (Community)	C-SHOP	COM	Commercial Shopping Center
CSCH***	Schools and Day nurseries	P-SCH	PUB	Public and Private Schools
CSCNSCN	Shopping Center (Neighborhood)	C-SHOP	COM	Commercial Shopping Center
CSCQSCQ	Shopping Center (Mini)	C-SHOP	COM	Commercial Shopping Center
CSCRSCR	Shopping Center (Regional)	C-SHOP	COM	Commercial Shopping Center
CSES***	Service Station	C-SERV	COM	Commercial Service-Auto
CSFS***	Small Food Store = 7/11 Type	C-RESTFF	COM	Commercial Fast Food Rest
CSM2***	Single-family and Manufactured Home	SFR	SFR	Single-family Residential
CSOH***	Fraternity (Social) House	SFR	SFR	Single-family Residential
CSS1***	Suburban and Country Stores	C-RET	COM	Commercial Retail
CSUM***	Supermarket	C-GROC	COM	Commercial Grocery Store
CTHD***	Theater Drive-In	P-REC	PUB	Public Recreation/Assembly
CTHE***	Theater	P-REC	PUB	Public Recreation/Assembly
CTTTTTT	Temporary Use Code	C-RET	COM	Commercial Retail

Table A-4. Fresno County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
CTWR***	Cell Tower Sites	P-GOV	PUB	Public Government Building
CVIR***	Vines - Raisin varieties	CROP	CROP	Crops
CVLM***	Vacant Land with Minor Improvements Only	MISC	Misc	Miscellaneous
CWAC***	Water Company	GOV	PUB	Government Administrative
CWAH***	Warehouse	I-WH	IND	Industrial Warehouse
CWALS01	Walnuts	FARM	FARM	Farm Buildings Including Primary RES
C******	Other	C-RET	COM	Commercial Retail
I******	Vacant	MISC	Misc	Miscellaneous.
IA02***	Apartment	MFR	MFR	Multi-Family Residential
IALM***	Almonds	CROP	CROP	Crops
IASC***	Auto Service and New Car Sales	C-AUTO	COM	Commercial Auto Sales
IBOA***	Bowling Alleys	P-REC	PUB	Public Recreation/Assembly
ICAW***	Car Wash	C-SERV	COM	Commercial Service-Auto
ICHU***	Churches	P-CH	PUB	Public Church
ICOG***	Cotton Gin and CompRES	I-WH	IND	Industrial Warehouse
ICOS***	Cold Storage and Slaughter Houses	I-WH	IND	Industrial Warehouse
ICS1***	Commercial Stores	C-RET	COM	Commercial Retail
IFAC***	Factory	I-LT	IND	Industrial Light
IFIEVLM	Field Cropland	CROP	CROP	Crops
IFII***	Banks / (FI)nancial (I)nstitutions	C-OFF	COM	Commercial Office
IFRL***	Fraternal Lodge	MFR	MFR	Multi-Family Residential
IFTM***	Freight Truck Terminals	I-WH	IND	Industrial Warehouse
IFUH***	Funeral Home	C-MED	COM	Commercial Medical
IG03WAH	Unknown	C-OFF	COM	Commercial Office
IGAR***	Garages	I-WH	IND	Industrial Warehouse
IGO1***	General Office	C-OFF	COM	Commercial Office
IGRA***	Granary and Rice Mills	I-LT	IND	Industrial Light
ILII***	Light Industrial	I-LT	IND	Industrial Light
ILIM***	Light Manufacturing	I-LT	IND	Industrial Light
ILUY***	Lumber Yard	I-LT	IND	Industrial Light
IM*****	Motel	C-HOTEL	COM	Hotel
IMD1***	Medical-Dental Office	C-MED	COM	Commercial Medical
IMH2PSL	Manufactured Home on Permanent Foundation	MH	MH	Mobile Home Single/Double
IMHP***	Manufactured Home Park	MH	MH	Mobile Home Single/Double
IMNS***	Mini Storage	I-WH	IND	Industrial Warehouse

Table A-4. Fresno County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
INEC***	Nectarines	CROP	CROP	Crops
INUR***	Nurseries (Plants)	FARM	FARM	Farm Buildings Including Primary RES
IOIL***	Oil and Gas "C" is Bulk Plant	I-HV	IND	Industrial Heavy Manufacture
IOM1***	Only Manufactured Home	MH	MH	Mobile Home Single/Double
IORA***	Oranges	CROP	CROP	Crops
IOUTLOT	Outlot	CROP	CROP	Crops
IPAH***	Packing House	I-WH	IND	Industrial Warehouse
IPLU***	Plums	CROP	CROP	Crops
IPND***	Ponding Basins	CROP	CROP	Crops
IPOS***	Potential Subdivision (Primary)	I-LT	IND	Industrial Light
IPOUCOS	Poultry	FARM	FARM	Farm Buildings Including Primary RES
IPSL***	Parking/Sales Lot (used cars)	C-AUTO	COM	Commercial Auto Sales
IPUB***	Publicly Owned	GOV	PUB	Government Administrative
IREC***	Recreation	P-REC	PUB	Public Recreation/Assembly
IRES***	Restaurant	C-FOOD	COM	Commercial Food-Retail
IS*****	Single-family Residential	SFR	SFR	Single-family Residential
ISCH***	Schools and Day nurseries	P-SCH	PUB	Public and Private Schools
ISES***	Service Station	C-SERV	COM	Commercial Service-Auto
ISFS***	Small Food Store = 7/11 Type	C-RESTFF	COM	Commercial Fast Food Rest
ISGP***	Sand-Gravel Pits	I-LT	IND	Industrial Light
ISM****	Single-family and Manufactured Home	SFR	SFR	Single-family Residential
ISOH***	Fraternity (Social) House	MFR	MFR	Multi-Family Residential
ISS1***	Suburban and Country Stores	C-RET	COM	Commercial Retail
ITRX***	Trees - Mixed	CROP	CROP	Crops
ITTTTTT	Temporary Use Code	I-LT	IND	Industrial Light
ITVXS02	Trees - Vines Mixed	CROP	CROP	Crops
ITWR***	Cell Tower Sites	I-LT	IND	Industrial Light
IVIR***	Vines - Raisin varieties	CROP	CROP	Crops
IVIX***	Vines - Mixed	CROP	CROP	Crops
IVLM***	Vacant Land with Minor Improvements Only	MISC	Misc	Miscellaneous
IWAC***	Water Company	GOV	PUB	Government Administrative
IWAH***	Warehouse	I-WH	IND	Industrial Warehouse
IWIN***	Winery	C-SHOP	COM	Commercial Shopping Center
IXXX***	Other	MISC	Misc	Miscellaneous
M******	Vacant	MISC	Misc	Miscellaneous

Table A-4. Fresno County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
MA01***	Apartment	MFR	MFR	Multi-Family Residential
MCHU***	Churches	P-CH	PUB	Public Church
MCLH***	Club House	MFR	MFR	Multi-Family Residential
MCOH***	Convalescent Hospital	C-HOS	COM	Hospital
MCS1***	Commercial Stores	I-WH	IND	Industrial Warehouse
MFRL***	Fraternal Lodge	MFR	MFR	Multi-Family Residential
MFUHS01	Funeral Home	C-MED	COM	Commercial Medical
MS*****	Single-family Residential	SFR	SFR	Single-family Residential
MSCH***	Schools and Day nurseries	P-SCH	PUB	Public and Private Schools
MSOH***	Fraternity (Social) House	MFR	MFR	Multi-Family Residential
MTTTTTT	Temporary Use Code	MFR	MFR	Multi-Family Residential
O******	Vacant	MISC	Misc	Miscellaneous
OALM***	Almonds	CROP	CROP	Crops
OAPP***	Apples	CROP	CROP	Crops
OAPR***	Apricots	CROP	CROP	Crops
OASP***	Asparagus	CROP	CROP	Crops
OBUS***	Bushberries	CROP	CROP	Crops
OCHE***	Cherries	CROP	CROP	Crops
OCOG***	Cotton Gin and CompRES	I-LT	IND	Industrial Light
ODAI***	Dairies	FARM	FARM	Farm Buildings Including Primary RES
ODRY***	Dry Farming	CROP	CROP	Crops
OEUCOM1	Eucalyptus Grove	CROP	CROP	Crops
OFIE***	Field Cropland	CROP	CROP	Crops
OKIW***	Kiwi	CROP	CROP	Crops
OLAB***	Labor Housing	MH	MH	Mobile Home Single/Double
OLEM***	Lemons	CROP	CROP	Crops
ONEC***	Nectarines	CROP	CROP	Crops
OOLI***	Olives	CROP	CROP	Crops
OORA***	Oranges	CROP	CROP	Crops
OPAH***	Packing House	I-WH	IND	Industrial Warehouse
OPAS***	Pasture – Native	CROP	CROP	Crops
OPCI***	Partially completed improvements	CROP	CROP	Crops
OPEA***	Peaches	CROP	CROP	Crops
OPEC***	Pecans	CROP	CROP	Crops
OPER***	Persimmons	CROP	CROP	Crops
OPIS***	Pistachios	CROP	CROP	Crops

Table A-4. Fresno County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
OPLU***	Plums	CROP	CROP	Crops
OPOM***	Pomegranates	CROP	CROP	Crops
OPOS***	Potential Subdivision (Primary)	CROP	CROP	Crops
OPOU***	Poultry	FARM	FARM	Farm Buildings Including Primary RES
OPRU***	Prunes	CROP	CROP	Crops
OREC***	Recreation	P-REC	PUB	Public Recreation/Assembly
OS*****	Single-family Residential	SFR	SFR	Single-family Residential
OSGP***	Sand-Gravel Pits	I-LT	IND	Industrial Light
OSM2***	Single-family and Manufactured Home	SFR	SFR	Single-family Residential
OSTA***	Stables	FARM	FARM	Farm Buildings Including Primary RES
OTIM***	Timberland	CROP	CROP	Crops
OTPZ***	Timber Preserve Zone	CROP	CROP	Crops
OTRX***	Trees – Mixed	CROP	CROP	Crops
OTTTTTT	Temporary Use Code	CROP	CROP	Crops
OTVX***	Trees – Vines Mixed	CROP	CROP	Crops
OVIR***	Vines – Raisin varieties	CROP	CROP	Crops
OVIT***	Vines – Table varieties	CROP	CROP	Crops
OVIX***	Vines – Mixed	CROP	CROP	Crops
OWAH***	Warehouse	I-WH	IND	Industrial Warehouse
OWAL***	Walnuts	CROP	CROP	Crops
OXXX***	Other	CROP	CROP	Crops
P000***	Vacant	MISC	Misc	Miscellaneous.
PA00***	Apartment	MFR	MFR	Multi-Family Residential
PS01***	Single-family Residential	SFR	SFR	Single-family Residential
S000***	Vacant	MISC	Misc	Miscellaneous
S0M1***	Only Manufactured Home	SFR	SFR	Single-family Residential
SA02***	Apartment	MFR	MFR	Multi-Family Residential
SCHU***	Churches	P-CH	PUB	Public Church
SCLH***	Club House	MFR	MFR	Multi-Family Residential
SFIE***	Field Cropland	CROP	CROP	Crops
SOM****	Only Manufactured Home	SFR	SFR	Single-family Residential
SPAS***	Pasture - Native	CROP	CROP	Crops
SPC1000	Partially completed improvements	SFR	SFR	Single-family Residential
SPO5***	Potential Subdivision (Primary)	SFR	SFR	Single-family Residential
SPUB***	Publicly Owned	GOV	PUB	Government Administrative

Table A-4. Fresno County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
SREC***	Recreation	P-REC	PUB	Public Recreation/Assembly
SS*****	Single-family Residential	SFR	SFR	Single-family Residential
SSCH***	Schools and Day nurseries	P-SCH	PUB	Public and Private Schools
SSGP***	Sand-Gravel Pits	I-LT	IND	Industrial Light
SSM1***	Single-family and Manufactured Home	SFR	SFR	Single-family Residential
Z******	Vacant	CROP	CROP	Crops
ZALM***	Almonds	CROP	CROP	Crops
ZAPP***	Apples	CROP	CROP	Crops
ZDAI***	Dairies	CROP	CROP	Crops
ZFIE***	Field Cropland	CROP	CROP	Crops
ZPAS***	Pasture - Native	CROP	CROP	Crops
ZPIS***	Pistachios	CROP	CROP	Crops
ZTRX***	Trees – Mixed	CROP	CROP	Crops
ZTVX***	Trees – Vines Mixed	CROP	CROP	Crops
ZVIR***	Vines – Raisin varieties	CROP	CROP	Crops
ZVIW***	Vines – Wine varieties	CROP	CROP	Crops

Table A-5. Glenn County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
A***	N/A	CROP/FARM	CROP/FARM	CROP/Farm Buildings Including Primary RES
ACY*	N/A	P-CH	PUB	Public Church
AW**	N/A	MISC-FARM	FARM	Miscellaneous Farm
C***	N/A	MISC	Misc	Miscellaneous
C5**	N/A	C-SERV	COM	Commercial Service-Auto
C8**	N/A	MISC-COM	COM	Miscellaneous Commercial
CA**	N/A	C-RET	COM	Commercial Retail
CA**	N/A	MH	MH	Mobile Home Single/Double
CE**	N/A	C-RET	COM	Commercial Retail
CF**	N/A	C-FOOD	COM	Commercial Food-Retail
CG**	N/A	C-GROC	COM	Commercial Grocery Store
CH**	N/A	C-HOTEL	COM	Hotel
CI**	N/A	C-AUTO	COM	Commercial Auto Sales
CJ**	N/A	C-SERV	COM	Commercial Service-Auto
CM**	N/A	C-MED	COM	Commercial Medical
CN**	N/A	C-RET	COM	Commercial Retail
CP**	N/A	C-RET	COM	Commercial Retail
CS**	N/A	P-SCH	PUB	Public and Private Schools
CU**	N/A	MH	MH	Mobile Home Single/Double
CYR2	N/A	AIR	PUB	Airport
CZ**	N/A	C-OFF	COM	Commercial Office
IT**	N/A	I-LT	IND	Industrial Light
N1**	N/A	SFR	SFR	Single-family Residential
N8**	N/A	MISC-PUB	PUB	Miscellaneous Public/Government
PM**	N/A	C-MED	COM	Commercial Medical
PZ**	N/A	C-OFF	COM	Commercial Office
R1**	N/A	SFR	SFR	Single-family Residential
R3**	N/A	MFR	MFR	Multi-Family Residential
R4**	N/A	MFR	MFR	Multi-Family Residential
R6**	N/A	MFR	MFR	Multi-Family Residential
R7**	N/A	MH	MH	Mobile Home Single/Double
W8**	N/A	MISC-RES	SFR	Miscellaneous Residential
WD**	N/A	CROP/FARM	CROP/FARM	CROP/Farm Buildings Including Primary RES
WK**	N/A	CROP/FARM	CROP/FARM	CROP/Farm Buildings Including Primary RES
WL**	N/A	CROP/FARM	CROP/FARM	CROP/Farm Buildings Including Primary RES

Table A-5. Glenn County Land Use Codes (contd.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
WO**	N/A	CROP/FARM	CROP/FARM	CROP/Farm Buildings Including Primary RES
WR**	N/A	CROP/FARM	CROP/FARM	CROP/Farm Buildings Including Primary RES
WT**	N/A	CROP/FARM	CROP/FARM	CROP/Farm Buildings Including Primary RES
WW**	N/A	CROP/FARM	CROP/FARM	CROP/Farm Buildings Including Primary RES

Table A-6. Lake County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
A****	N/A	CROP	CROP	Crops
A1***	N/A	CROP	CROP	Crops
AD***	N/A	CROP	CROP	Crops
ADR**	N/A	FARM	FARM	Farm Buildings Including Primary RES
AG***	N/A	FARM	FARM	Farm Buildings Including Primary RES
AL***	N/A	FARM	FARM	Farm Buildings Including Primary RES
ALR**	N/A	FARM	FARM	Farm Buildings Including Primary RES
AO***	N/A	CROP	CROP	Crops
AT***	N/A	CROP	CROP	Crops
ATM**	N/A	Misc	Misc	Miscellaneous
ATR**	N/A	SFR	SFR	Single-family Residential with Basement
AV***	N/A	CROP	CROP	Crops
AXR**	N/A	SFR	SFR	Single-family Residential with Basement
B****	N/A	CROP	CROP	Crops
B1***	N/A	CROP	CROP	Crops
BGR**	N/A	SFR	SFR	Single-family Residential with Basement
BL***	N/A	FARM	FARM	Farm Buildings Including Primary RES
BO***	N/A	CROP	CROP	Crops
BR***	N/A	CROP	CROP	Crops
BT***	N/A	CROP	CROP	Crops
BTR**	N/A	SFR	SFR	Single-family Residential with Basement
BV***	N/A	CROP	CROP	Crops
C****	N/A	Misc	MISc	Miscellaneous
C3***	N/A	MFR	MFR	Multi-Family Residential
C4***	N/A	SFR	SFR	Single-family Residential with Basement
C6***	N/A	COM	C-SERV	Commercial Service-Auto
CA***	N/A	CROP	CROP	Crops
CB***	N/A	COM	C-OFF	Commercial Office
CE***	N/A	COM	C-RET	Commercial Retail
CF***	N/A	COM	C-REST	Commercial Restaurants

Table A-6. Lake County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
CH***	N/A	COM	C-HOTEL	Hotel
CI***	N/A	COM	C-AUTO	Commercial Auto Sales
CJ***	N/A	COM	C-DEAL	Full Service Auto Dealership
CM***	N/A	COM	C-HOS	Hospital
CN***	N/A	COM	MISC-COM	Miscellaneous Commercial
CP***	N/A	IND	I-WH	Industrial Warehouse
CQ***	N/A	IND	I-LT	Industrial Light
CR***	N/A	Misc	MISC	Miscellaneous
CU***	N/A	MH	MH	Mobile Home Single/Double
CW***	N/A	IND	I-WH	Industrial Warehouse
CZ***	N/A	COM	C-OFF	Commercial Office
G****	N/A	Misc	MISC	Miscellaneous
G1***	N/A	CROP	CROP	Crops
G4***	N/A	SFR	SFR	Single-family Residential W/Basement
G9***	N/A	MH	MH	Mobile Home Single/Double
GE***	N/A	COM	C-RET	Commercial Retail
GF***	N/A	COM	C-REST	Commercial Restaurants
GS***	N/A	PUB	P-SCH	Public and Private Schools
I****	N/A	Misc	MISC	Miscellaneous
I1***	N/A	CROP	CROP	Crops
IVBXF	N/A	CROP	CROP	Crops
N****	N/A	PUB	P-REC	Public Recreation/Assembly
N1***		CROP	CROP	Crops
NI***		COM	C-DEAL	Full Service Auto Dealership
NV***		Misc	MISC	Miscellaneous
R****		Misc	MISC	Miscellaneous
R1***		CROP	CROP	Crops
R3***		MFR	MFR	Multi-Family Residential
R4***		SFR	SFR	Single-family Residential with Basement
R7***		CROP	CROP	Crops
R7***		Misc	MISC	Miscellaneous
R8***		FARM	FARM	Farm Buildings Including Primary RES
R9***		FARM	FARM	Farm Buildings Including Primary RES
RV***		CROP	CROP	Crops
RV***		Misc	MISC	Miscellaneous

Table A-6. Lake County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
RX***		CROP	CROP	Crops
RZ***		COM	C-OFF	Commercial Office
U****		CROP	CROP	Crops
U1***		CROP	CROP	Crops
UT***		CROP	CROP	Crops
UV***		CROP	CROP	Crops
Y****		Misc	MISC	Miscellaneous
Y4***		SFR	SFR	Single-family Residential with Basement
YC***		PUB	P-CH	Public Church
YI***		COM	C-AUTO	Commercial Auto Sales
YM***		COM	C-HOS	Hospital
YS***		PUB	P-SCH	Public and Private Schools

Table A-7. Madera County Land Use Codes

Due to its size the Land Use Codes for Madera County will not be included. The Land Use Codes will be available electronically upon request.

Table A-8. Merced County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
0101	Single-family residence – Single-family residence	SFR	SFR	Single-family Residential
0102	Single-family residence – Minor multiple residence	SFR	SFR	Single-family Residential
0103	Single-family residence – Major multiple residence	SFR	SFR	Single-family Residential
0104	Single-family residence – Minor commercial	SFR	SFR	Single-family Residential
0105	Single-family residence – Major commercial	SFR	SFR	Single-family Residential
0106	Single-family residence – Industrial	SFR	SFR	Single-family Residential
0130	Single-family residence – Industrial	SFR	SFR	Single-family Residential with Basement
0201	Minor multiple residence – Single-family residence	MFR	MFR	Multi-Family Residential
0202	Minor multiple residence – Minor multiple residence	MFR	MFR	Multi-Family Residential
0203	Minor multiple residence – Major multiple residence	MFR	MFR	Multi-Family Residential
0204	Minor multiple residence – Minor commercial	MFR	MFR	Multi-Family Residential
0205	Minor multiple residence – Major commercial	MFR	MFR	Multi-Family Residential
0207	Minor multiple residence – Major commercial	MFR	MFR	Multi-Family Residential
0301	Major multiple residence – Single-family residence	MFR	MFR	Multi-Family Residential
0302	Major multiple residence – Minor multiple residence	MFR	MFR	Multi-Family Residential
0303	Major multiple residence – Major multiple residence	MFR	MFR	Multi-Family Residential
0304	Major multiple residence – Minor commercial	MFR	MFR	Multi-Family Residential
0305	Major multiple residence – Major commercial	MFR	MFR	Multi-Family Residential
0307	Major multiple residence – Major commercial	MFR	MFR	Multi-Family Residential
0401	Minor commercial – Single-family residence	COM	C-RET	Commercial Retail
0402	Minor commercial – Minor multiple residence	COM	C-RET	Commercial Retail
0403	Minor commercial – Major multiple residence	COM	C-RET	Commercial Retail

Table A-8. Merced County Land Use Codes (contd.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
0404	Minor commercial – Minor commercial	COM	C-RET	Commercial Retail
0405	Minor commercial – Major commercial	COM	C-RET	Commercial Retail
0406	Minor commercial – Industrial	COM	C-RET	Commercial Retail
0407	Minor commercial – Farm	COM	C-RET	Commercial Retail
0408	Minor commercial – Farm	COM	C-RET	Commercial Retail
0414	Minor commercial – Poultry Ranch	COM	C-RET	Commercial Retail
0430	Minor commercial – Poultry Ranch	COM	C-RET	Commercial Retail
0502	Major commercial – Minor multiple residence	COM	C-RET	Commercial Retail
0505	Major commercial – Major commercial	COM	C-RET	Commercial Retail
0506	Major commercial – Industrial	COM	C-RET	Commercial Retail
0601	Industrial – Single-family residence	IND	I-LT	Industrial Light
0603	Industrial – Major multiple residence	IND	I-LT	Industrial Light
0604	Industrial – Minor commercial	IND	I-LT	Industrial Light
0606	Industrial – Industrial	IND	I-LT	Industrial Light
0618	Industrial – Industrial	IND	I-LT	Industrial Light
0701	Farm – Single-family residence	FARM	FARM	Farm Buildings Including Primary RES
0702	Farm – Minor multiple residence	FARM	FARM	Farm Buildings Including Primary RES
0703	Farm – Major multiple residence	FARM	FARM	Farm Buildings Including Primary RES
0704	Farm – Minor commercial	FARM	FARM	Farm Buildings Including Primary RES
0706	Farm – Industrial	FARM	FARM	Farm Buildings Including Primary RES
0707	Farm – Farm	FARM	FARM	Farm Buildings Including Primary RES
0708	Farm – Trees or Vines	FARM	FARM	Farm Buildings Including Primary RES
0711	Farm – Vacant urban acreage	FARM	FARM	Farm Buildings Including Primary RES
0712	Farm – Miscellaneous	FARM	MISC-FARM	Miscellaneous Farm
0713	Farm – Miscellaneous	FARM	FARM	Farm Buildings Including Primary RES

Table A-8. Merced County Land Use Codes (contd.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
0801	Trees or Vines – Single-family residence	CROP	CROP	Crops
0802	Trees or Vines – Minor multiple residence	CROP	CROP	Crops
0803	Trees or Vines – Major multiple residence	CROP	CROP	Crops
0804	Trees or Vines – Minor commercial	CROP	CROP	Crops
0806	Trees or Vines – Industrial	CROP	CROP	Crops
0807	Trees or Vines – Farm	CROP	CROP	Crops
0808	Trees or Vines – Trees or Vines	CROP	CROP	Crops
0812	Trees or Vines – Trees or Vines	FARM	FARM	Farm Buildings Including Primary RES
0813	Trees or Vines – Dairy	CROP	CROP	Crops
0814	Trees or Vines – Poultry Ranch	CROP	CROP	Crops
0901	Grazing – Farm	FARM	FARM	Farm Buildings Including Primary RES
0904	Grazing – Farm	FARM	FARM	Farm Buildings Including Primary RES
0907	Grazing – Farm	FARM	FARM	Farm Buildings Including Primary RES
0909	Grazing – Grazing	FARM	FARM	Farm Buildings Including Primary RES
0911	Grazing – Vacant urban acreage	FARM	FARM	Farm Buildings Including Primary RES
1001	Vacant land residential	Misc	MISC	Miscellaneous
1002	Vacant land minor multiple residence	Misc	MISC	Miscellaneous
1003	Vacant land major multiple residence	Misc	MISC	Miscellaneous
1004	Vacant land minor commercial	Misc	MISC	Miscellaneous
1005	Vacant land major commercial	Misc	MISC	Miscellaneous
1006	Vacant land industrial	Misc	MISC	Miscellaneous
1012	Miscellaneous	Misc	Misc	Miscellaneous
1020	Vacant land – Church	Misc	MISC	Miscellaneous
1030	Vacant land – Condominium	Misc	MISC	Miscellaneous
1201	Miscellaneous – Single-family residence	SFR	MISC-RES	Miscellaneous Residential
1202	Miscellaneous – Minor multiple residence	MFR	MISC-MFR	Miscellaneous Residential
1203	Miscellaneous – Major multiple residence	MFR	MISC-MFR	Miscellaneous Residential

Table A-8. Merced County Land Use Codes (contd.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
1204	Miscellaneous – Minor commercial	COM	MISC-COM	Miscellaneous Commercial
1207	Miscellaneous – Farm	FARM	MISC-FARM	Miscellaneous Farm
1208	Miscellaneous – Trees or Vines	CROP	MISC-AG	Miscellaneous Agriculture
1209	Miscellaneous – Grazing	CROP	MISC-AG	Miscellaneous Agriculture
1211	Miscellaneous – Vacant urban acreage	CROP	MISC-AG	Miscellaneous Agriculture
1212	Miscellaneous – Miscellaneous	CROP	MISC-AG	Miscellaneous Agriculture
1307	Miscellaneous	Misc	Misc	Miscellaneous
1313	Dairy	IND	I-LT	Industrial Light
1408	Miscellaneous	Misc	Misc	Miscellaneous
1414	Poultry Ranch	IND	I-LT	Industrial Light
1515	Exempt government owned	PUB	P-GOV	Public Government Building
1616	Utility Roll	PUB	MISC-PUB	Miscellaneous Public/Gov
1701	Mobile home in park	MH	MH	Mobile Home Single/Double
1702	Mobile home on non-owner land	MH	MH	Mobile Home Single/Double
1703	Mobile home subdivision	MH	MH	Mobile Home Single/Double
1704	Mobile home on owner land	MH	MH	Mobile Home Single/Double
1717	Mobile home park	MH	MH	Mobile Home Single/Double
1818	Sand and Gravel	Misc	MISC	Miscellaneous
1919	Assessed government owned	PUB	P-GOV	Public Government Building
2020	Church	PUB	P-CH	Public Church
2121	Cemetery	Misc	MISC	Miscellaneous
3030	Common area for condominiums	COM	MISC-COM	Miscellaneous Commercial
4242	Non-contract duck club	PUB	P-REC	Public Recreation/Assembly
4343	Contract duck club	PUB	P-REC	Public Recreation/Assembly
7070	Oil R/W	IND	I-LT	Industrial Light

Table A-9. Placer County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
00	Vacant, All Types – not assigned	MISC	Misc	Miscellaneous
01	Single-family residence, halfplex	SFR	SFR	Single-family Residential
02	2 single-family residences, duplex	MFR	MFR	Multi-Family Residential
03	3 single-family residences, triplex	MFR	MFR	Multi-Family Residential
04	Single-family residence, Condominium	SFR	SFR	Single-family Residential
05	Apartments, 4 units or more	MFR	MFR	Multi-Family Residential
06	Timeshares	MISC-RES	SFR	Miscellaneous Residential
07	Residential, auxilary improvements	MISC-RES	SFR	Miscellaneous Residential
08	Mobile Home outside of park	MH	MH	Mobile Home Single/Double
09	Mobile Home in Mobile Home park	MH	MH	Mobile Home Single/Double
10	Vacant, subdivided residential	MISC	Misc	Miscellaneous
11	Commercial store	C-RET	COM	Commercial Retail
12	Suburban store	C-RET	COM	Commercial Retail
13	Mini-markets, no gas	C-GROC	COM	Commercial Grocery Store
14	Office Condominium	C-OFF	COM	Commercial Office
15	Shopping center	C-SHOP	COM	Commercial Shopping Center
16	Residence on commercial land	MISC-COM	COM	Miscellaneous Commercial
17	Office General	C-OFF	COM	Commercial Office
18	Hotels, motels, resorts	C-HOTEL	COM	Hotel
19	Office medical/dental	C-MED	COM	Commercial Medical
20	Vacant, commercial	MISC	Misc	Miscellaneous
21	Restaurants, cocktail lounges	C-REST	COM	Commercial Restaurants
22	Fast food restaurant	C-RESTFF	COM	Commercial Fast Food Rest
23	Banks, Savings and Loans, credit unions	C-OFF	COM	Commercial Office
24	Mini-market, with gas	C-GROC	COM	Commercial Grocery Store
25	Service station	C-SERV	COM	Commercial Service-Auto
26	Auto sales, repair	C-AUTO	COM	Commercial Auto Sales
27	Parking lots	MISC	Misc	Miscellaneous
28	Mobile Home Park	MH	MH	Mobile Home Single/Double
29	Miscellaneous Commercial	MISC-COM	COM	Miscellaneous Commercial
30	Vacant Industrial	MISC	Misc	Miscellaneous
31	Light Industrial	I-LT	IND	Industrial Light

Table A-9. Placer County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
32	Heavy Industrial	I-HV	IND	Industrial Heavy Manufacture
33	Food Processing	I-LT	IND	Industrial Light
35	Industrial Condominium	MISC-IND	IND	Miscellaneous Industrial
36	Uncovered storage, wrecking yard	MISC-IND	IND	Miscellaneous Industrial
37	Mini-storage, covered storage	I-WH	IND	Industrial Warehouse
38	Warehouse	I-WH	IND	Industrial Warehouse
39	Miscellaneous Industrial	MISC-IND	IND	Miscellaneous Industrial
40	Irrigated Farm	CROP	CROP	Crops
41	Orchards, vineyards	CROP	CROP	Crops
44	Rice crop	CROP	CROP	Crops
48	Poultry and small animals	FARM	FARM	Farm Buildings Including Primary RES
50	Vacant, dry farm	MISC	MISC	Miscellaneous
51	Dry farm with residence	FARM	FARM	Farm Buildings Including Primary RES
55	Timberland, unrestricted	CROP	CROP	Crops
56	Timberland, zoned TPZ	CROP	CROP	Crops
60	Definition Not Available	MISC	MISC	Miscellaneous
61	Non-profit camps/parks	P-REC	PUB	Public Recreation/Assembly
62	Theater, bowling alley	P-REC	PUB	Public Recreation/Assembly
63	Marina, pier	PORT	PUB	Ports
64	Lodges, halls	P-REC	PUB	Public Recreation/Assembly
65	Tennis, swimming clubs	P-REC	PUB	Public Recreation/Assembly
66	Golf course	P-REC	PUB	Public Recreation/Assembly
67	Ski Facility	P-REC	PUB	Public Recreation/Assembly
68	Camps and parks, general	P-REC	PUB	Public Recreation/Assembly
69	Miscellaneous recreational	P-REC	PUB	Public Recreation/Assembly
71	Churches	P-CH	PUB	Public Church
72	Schools	P-SCH	PUB	Public and Private Schools
73	Day Care Centers	DAYCARE	COM	Daycare
74	Hospitals-Community	C-HOS	COM	Hospital
75	Hospitals-Convalescent	C-HOS	COM	Hospital
76	Miscellaneous public buildings	MISC-PUB	PUB	Miscellaneous Public/Gov
77	Cemeteries	MISC	MISC	Miscellaneous
78	Airport	AIR	PUB	Airport
79	Miscellaneous institutional	MISC-PUB	PUB	Miscellaneous Public/Government
81	Utilities, public and private	P-GOV	PUB	Public Government Building

Table A-9. Placer County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
82	Mining Quarry	I-HV	IND	Industrial Heavy Manufacture
83	Mineral Rights	MISC	MISC	Miscellaneous
84	Mining Claims	MISC	MISC	Miscellaneous
85	Pipeline Right of Way	MISC	MISC	Miscellaneous
86	Wetlands, vernal pools	MISC	MISC	Miscellaneous
87	Rivers, lakes, reservoir, canal	MISC	MISC	Miscellaneous
88	Highways, road, streets	MISC	MISC	Miscellaneous
89	Common Area	MISC	MISC	Miscellaneous
90	Greenbelt	MISC	MISC	Miscellaneous
97	CLCA restriction, non-renewal	MISC	MISC	Miscellaneous
98	CLCA restriction, under contract	MISC	MISC	Miscellaneous

Table A-10. Plumas County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
00	Unassigned	MISC	MISC	Miscellaneous
05	Manufactured Homes	MFR	MFR	Multi-Family Residential
10	Vacant Lot Residential	MISC	MISC	Miscellaneous
1001	Vacant Lot with miscellaneous improvements	MISC	MISC	Miscellaneous
11	Single-family Residential	SFR	SFR	Single-family Residential
12	Condominiums – Townhouses	MFR	MFR	Multi-Family Residential
20	Vacant Land Multiple	MISC	MISC	Miscellaneous
2001	Vacant Land Multiple with miscellaneous improvements	MISC	MISC	Miscellaneous
21	Multiple Residential Miscellaneous	MFR	MFR	Multi-Family Residential
211	Multiple Residential	MFR	MFR	Multi-Family Residential
212	Two Dwelling Units	MFR	MFR	Multi-Family Residential
2122	Duplex	MFR	MFR	Multi-Family Residential
213	Three Dwelling Units	MFR	MFR	Multi-Family Residential
2133	Triplex	MFR	MFR	Multi-Family Residential
215	5 to 9 Apartment units	MFR	MFR	Multi-Family Residential
216	10 to 19 Apartment units	MFR	MFR	Multi-Family Residential
217	20 to 49 Apartment units	MFR	MFR	Multi-Family Residential
218	50 or more Apartment units	MFR	MFR	Multi-Family Residential
23	Manufactured Home Parks	MFR	MFR	Multi-Family Residential
30	Vacant Land Rural	MISC	MISC	Miscellaneous
3001	Vacant Rural with miscellaneous improvements	MISC	MISC	Miscellaneous
31	Rural with residence	FARM	FARM	Farm Buildings Including Primary RES
33	LCA Contracts	MISC	MISC	Miscellaneous
3301	LCA Contract with improvements	MISC	MISC	Miscellaneous
35	Definition Not Available	MISC	MISC	Miscellaneous
36	TPZ Contract with residential	MISC	MISC	Miscellaneous
37	TPZ Contract Land	MISC	MISC	Miscellaneous
40	Vacant Land Industrial	MISC	MISC	Miscellaneous
4001	Vacant Industrial with miscellaneous improvements	MISC	MISC	Miscellaneous
41	Industrial	I-LT	IND	Industrial Light
50	Vacant Land Commercial	MISC	MISC	Miscellaneous
5001	Vacant Commercial with miscellaneous improvements	MISC	MISC	Miscellaneous
51	Commercial Improved	MISC-COM	COM	Miscellaneous Commercial

Table A-10. Plumas County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
511	Retail	C-RET	COM	Commercial Retail
512	Office	C-OFF	COM	Commercial Office
5121	Medical Office	C-MED	COM	Commercial Medical
513	Motel - Bed and Breakfast	C-HOTEL	COM	Hotel
514	Automobile Related	C-AUTO	COM	Commercial Auto Sales
515	Fast Gas with Convenience Store	C-SERV	COM	Commercial Service-Auto
516	Food Store or Grocery Store	C-GROC	COM	Commercial Grocery Store
52	Definition Not Available	MISC	MISC	MISC
54	Recreational	P-REC	PUB	Public Recreation/Assembly
542	Definition Not Available	MISC	MISC	Miscellaneous
543	Definition Not Available	MISC	MISC	Miscellaneous
57	Hanger	I-WH	IND	Industrial Warehouse
60	Vacant Land Valued by SBE	MISC	MISC	Miscellaneous
70	Condominium/Townhouse Common Area	MFR	MFR	Multi-Family Residential
80	Vacant Land Non-taxable	MISC	MISC	Miscellaneous
81	Improved Land Non-taxable	MISC	MISC	Miscellaneous
82	Definition Not Available	MISC	MISC	Miscellaneous
90	Mineral Rights	MISC	MISC	Miscellaneous
AD	Definition Not Available	MISC	MISC	Miscellaneous
AF	Definition Not Available	MISC	MISC	Miscellaneous
AG	Definition Not Available	MISC	MISC	Miscellaneous
AGXX	Definition Not Available	MISC	MISC	Miscellaneous
AX	Definition Not Available	MISC	MISC	Miscellaneous
BG	Definition Not Available	MISC	MISC	Miscellaneous
BGXX	Definition Not Available	MISC	MISC	Miscellaneous
BV	Definition Not Available	MISC	MISC	Miscellaneous
BX	Definition Not Available	MISC	MISC	Miscellaneous
CA	Definition Not Available	MISC	MISC	Miscellaneous
CB	Definition Not Available	MISC	MISC	Miscellaneous
CC	Definition Not Available	MISC	MISC	Miscellaneous
CF	Definition Not Available	MISC	MISC	Miscellaneous
CG	Definition Not Available	MISC	MISC	Miscellaneous
CH	Definition Not Available	MISC	MISC	Miscellaneous
CL	Definition Not Available	MISC	MISC	Miscellaneous
CM	Definition Not Available	MISC	MISC	Miscellaneous
CO	Definition Not Available	MISC	MISC	Miscellaneous
CORX	Definition Not Available	MISC	MISC	Miscellaneous

Table A-10. Plumas County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
COXX	Definition Not Available	MISC	MISC	Miscellaneous
CP	Definition Not Available	MISC	MISC	Miscellaneous
CR	Definition Not Available	MISC	MISC	Miscellaneous
CRRN	Definition Not Available	MISC	MISC	Miscellaneous
CRXX	Definition Not Available	MISC	MISC	Miscellaneous
CS	Definition Not Available	MISC	MISC	Miscellaneous
CSXX	Definition Not Available	MISC	MISC	Miscellaneous
CV	Definition Not Available	MISC	MISC	Miscellaneous
CW	Definition Not Available	MISC	MISC	Miscellaneous
CX	Definition Not Available	MISC	MISC	Miscellaneous
GE	Definition Not Available	MISC	MISC	Miscellaneous
GF	Definition Not Available	MISC	MISC	Miscellaneous
GO	Definition Not Available	MISC	MISC	Miscellaneous
GR	Definition Not Available	MISC	MISC	Miscellaneous
GU	Definition Not Available	MISC	MISC	Miscellaneous
GV	Definition Not Available	MISC	MISC	Miscellaneous
GX	Definition Not Available	MISC	MISC	Miscellaneous
IF	Definition Not Available	MISC	MISC	Miscellaneous
IN	Definition Not Available	MISC	MISC	Miscellaneous
IP	Definition Not Available	MISC	MISC	Miscellaneous
IQ	Definition Not Available	MISC	MISC	Miscellaneous
IV	Definition Not Available	MISC	MISC	Miscellaneous
IW	Definition Not Available	MISC	MISC	Miscellaneous
IX	Definition Not Available	MISC	MISC	Miscellaneous
JX	Definition Not Available	MISC	MISC	Miscellaneous
NC	Definition Not Available	MISC	MISC	Miscellaneous
NM	Definition Not Available	MISC	MISC	Miscellaneous
NN	Definition Not Available	MISC	MISC	Miscellaneous
NR	Definition Not Available	MISC	MISC	Miscellaneous
NT	Definition Not Available	MISC	MISC	Miscellaneous
NV	Definition Not Available	MISC	MISC	Miscellaneous
NX	Definition Not Available	MISC	MISC	Miscellaneous
NXRX	Definition Not Available	MISC	MISC	Miscellaneous
QX	Definition Not Available	MISC	MISC	Miscellaneous
RC	Definition Not Available	MISC	MISC	Miscellaneous
RF	Definition Not Available	MISC	MISC	Miscellaneous
RI	Definition Not Available	MISC	MISC	Miscellaneous

Table A-10. Plumas County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
RIRX	Definition Not Available	MISC	MISC	Miscellaneous
RJ	Definition Not Available	MISC	MISC	Miscellaneous
RK	Definition Not Available	MISC	MISC	Miscellaneous
RL	Definition Not Available	MISC	MISC	Miscellaneous
RM	Definition Not Available	MISC	MISC	Miscellaneous
RMXX	Definition Not Available	MISC	MISC	Miscellaneous
RN	Definition Not Available	MISC	MISC	Miscellaneous
RNXX	Definition Not Available	MISC	MISC	Miscellaneous
RT	Definition Not Available	MISC	MISC	Miscellaneous
RTXF	Definition Not Available	MISC	MISC	Miscellaneous
RTXX	Definition Not Available	MISC	MISC	Miscellaneous
RV	Definition Not Available	MISC	MISC	Miscellaneous
RX	Definition Not Available	MISC	MISC	Miscellaneous
RXDX	Definition Not Available	MISC	MISC	Miscellaneous
RXMX	Definition Not Available	MISC	MISC	Miscellaneous
RXRE	Definition Not Available	MISC	MISC	Miscellaneous
RXXF	Definition Not Available	MISC	MISC	Miscellaneous
RXXX	Definition Not Available	MISC	MISC	Miscellaneous
SO	Definition Not Available	MISC	MISC	Miscellaneous
SV	Definition Not Available	MISC	MISC	Miscellaneous
SX	Definition Not Available	MISC	MISC	Miscellaneous
TX	Definition Not Available	MISC	MISC	Miscellaneous
UC	Definition Not Available	MISC	MISC	Miscellaneous
UF	Definition Not Available	MISC	MISC	Miscellaneous
UFXX	Definition Not Available	MISC	MISC	Miscellaneous
UT	Definition Not Available	MISC	MISC	Miscellaneous
UV	Vacant Land – Code Being Phased Out	MISC	MISC	Miscellaneous
UVXX	Definition Not Available	MISC	MISC	Miscellaneous
UX	Definition Not Available	MISC	MISC	Miscellaneous
VX	Definition Not Available	MISC	MISC	Miscellaneous
XX	Definition Not Available	MISC	MISC	Miscellaneous
YC	Definition Not Available	MISC	MISC	Miscellaneous
YN	Definition Not Available	MISC	MISC	Miscellaneous
YT	Definition Not Available	MISC	MISC	Miscellaneous
YV	Definition Not Available	MISC	MISC	Miscellaneous
YX	Definition Not Available	MISC	MISC	Miscellaneous
ZX	Definition Not Available	MISC	MISC	Miscellaneous

Table A-11. Sacramento County Land Use Codes

Due to its size the Land Use Codes for Sacramento County will not be included. The Land Use Codes will be available electronically upon request.

Table A-12. San Joaquin County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
001	Vacant Residential Lot – Development with Utilities	MISC	MISC	Miscellaneous
002	Vacant Lot with PROB. W/C Precludes Building A RE	MISC	MISC	Miscellaneous
003	Vacant Lot – Totally Unusable (incurable)	MISC	MISC	Miscellaneous
004	Vacant Residential Lot with miscellaneous Residential IMPRS (garage)	MISC	MISC	Miscellaneous
005	Vacant Residential Subdivision Site	MISC	MISC	Miscellaneous
006	Vacant Residential Lot-Undeveloped	MISC	MISC	Miscellaneous
007	Potential Residential Subdivision	MISC	MISC	Miscellaneous
010	Single-Family Dwelling (SFD)	SFR	SFR	Single-family Residential
011	Condominium Unit	MFR	MFR	Multi-Family Residential
012	Planned Unit Residential Development (PURD)	SFR	SFR	Single-family Residential
013	Single-Family Residence with Secondary Residential Square Footage	SFR	SFR	Single-family Residential
014	SFD with Secondary Use (i.e., barber shop)	SFR	SFR	Single-family Residential
015	Zero Lot Line Residential	MISC	MISC	Miscellaneous
016	Residential Lot with Mobile Home	MH	MH	Mobile Home Single/Double
017	Single-Family with Common Wall (duet, halfplex, etc.)	SFR	SFR	Single-family Residential
020	Vacant Lot (zoned for two units)	MISC	MISC	Miscellaneous
021	One Duplex – One Building	MFR	MFR	Multi-Family Residential
022	Two SFDs On Single Parcel	MFR	MFR	Multi-Family Residential
030	Vacant Lot Zoned for 3 or 4 Units	MISC	MISC	Miscellaneous
031	Single Triplex – (3 units, 1 structure)	MFR	MFR	Multi-Family Residential
032	Three Units - 2 or More Structures	MFR	MFR	Multi-Family Residential
034	Single Fourplex	MFR	MFR	Multi-Family Residential
035	Four Units, 2 or More Structures	MFR	MFR	Multi-Family Residential
040	Vacant Lots Zoned for Apartments	MISC	MISC	Miscellaneous

Table A-12. San Joaquin County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
041	5-10 Residential Units – Single Building	MFR	MFR	Multi-Family Residential
042	5-10 Residential Units – 2 or more Buildings	MFR	MFR	Multi-Family Residential
043	11-20 Residential Units – One Structure	MFR	MFR	Multi-Family Residential
044	11-20 Residential Units – 2 or more Buildings	MFR	MFR	Multi-Family Residential
045	21-40 Units	MFR	MFR	Multi-Family Residential
046	41-100 Units	MFR	MFR	Multi-Family Residential
047	Over 100 Units	MFR	MFR	Multi-Family Residential
048	High-Rise Apartments	MFR	MFR	Multi-Family Residential
050	Rural Residential – Vacant Homesite	FARM	FARM	Farm Buildings Including Primary Residence
051	Rural Residence – 1 Residence	SFR	SFR	Single-family Residential
052	Rural Residential – 2 or more residences	MFR	MFR	Multi-Family Residential
053	Rural Residential – Vacant – Development with	FARM	FARM	Farm Buildings Including Primary Residence
054	Rural Residences. - with Miscellaneous Residences. IMPS; Only	FARM	FARM	Farm Buildings Including Primary Residence
055	Labor Camp	FARM	FARM	Farm Buildings Including Primary Residence
056	Rural Residential with Mobil Home	MH	MH	Mobile Home Single/Double
059	Residential Care Home (6 units or less)	MFR	MFR	Multi-Family Residential
060	Motels Less Than 50 Units	COM	C-HOTEL	Hotel
061	Motels Over 50 Units	COM	C-HOTEL	Hotel
062	Motels less than 50 units with some kitchens	COM	C-HOTEL	Hotel
063	Motels over 50 Units with some Kitchens	COM	C-HOTEL	Hotel
064	Motels Less Than 50 Units with Shops	COM	C-HOTEL	Hotel
065	Motels Over 50 Units with Shops	COM	C-HOTEL	Hotel
068	Resort Motels – Cabins, Etc.	COM	C-HOTEL	Hotel
070	Hotel without Restaurant	COM	C-HOTEL	Hotel
071	Hotel with Restaurant	COM	C-HOTEL	Hotel
078	Rooming House – Convent – Rectory, Etc.	PUB	P-GOV	Public Government Building

Table A-12. San Joaquin County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
080	Common Areas – No Structures	MISC	MISC	Miscellaneous
081	Common Areas – with Structures	PUB	P-REC	Public Recreation/Assembly
082	Common Areas – Roads and Streets	Misc	MISC	Miscellaneous
090	Mobile Home Park	MH	MH	Mobile Home Single/Double
091	Overnight Type Trailer Park	MH	MH	Mobile Home Single/Double
092	Mobile Home Park with Overnight Facilities	MH	MH	Mobile Home Single/Double
093	Resort Type Trailer Park	MH	MH	Mobile Home Single/Double
094	Mobile Home Condominium Lot	MH	MH	Mobile Home Single/Double
095	Mobile Home Appurtenances	MH	MH	Mobile Home Single/Double
096	Mobile Home	MH	MH	Mobile Home Single/Double
100	Vacant Commercial Land – Undeveloped	MISC	MISC	Miscellaneous
101	Vacant Commercial Land with Utilities	MISC	MISC	Miscellaneous
102	Vacant Commercial Land with Miscellaneous IMPS	MISC	MISC	Miscellaneous
107	Potential Commercial Subdivision	COM	MISC-COM	Miscellaneous Commercial
110	Single-Story	COM	MISC-COM	Miscellaneous Commercial
111	Multiple-Story Stories	COM	MISC-COM	Miscellaneous Commercial
112	Multiple Stores in one Building	COM	MISC-COM	Miscellaneous Commercial
113	Store with Residential Unit or Units	COM	C-RET	Commercial Retail
114	Store Condo	COM	C-RET	Commercial Retail
120	1 store and 1 office	COM	C-OFF	Commercial Office
121	Multiple Combination of Offices, Shops	COM	C-OFF	Commercial Office
130	1-Story Department Store	COM	C-RET	Commercial Retail
131	2-Story Department Store	COM	C-RET	Commercial Retail
140	Grocery Store	COM	C-GROC	Commercial Grocery Store
141	Supermarkets	COM	C-RET	Commercial Retail
142	Convenience Store	COM	C-RET	Commercial Retail
143	Convenience Store with Gas Sales	COM	C-RET	Commercial Retail
144	Fruit Stand	COM	C-FOOD	Commercial Food-Retail
150	Regional Shopping Center	COM	C-RET	Commercial Retail
151	Community Shopping Center	COM	C-RET	Commercial Retail

Table A-12. San Joaquin County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
152	Neighborhood Shopping Center	COM	C-RET	Commercial Retail
153	Individual Parcel Within Regional Shopping	COM	C-RET	Commercial Retail
154	Individual Parcel Within Community Center	COM	C-RET	Commercial Retail
155	Individual Parcel within neighborhood Shopping	COM	C-RET	Commercial Retail
156	Shopping Center Common Area	COM	C-RET	Commercial Retail
170	1-Story Office Building	COM	C-OFF	Commercial Office
171	2-Story Office Building	COM	C-OFF	Commercial Office
172	3 or More Story Office Building	COM	C-OFF	Commercial Office
173	Office Building with Residential Unit or Units	COM	C-OFF	Commercial Office
180	Assisted Living Residence	SFR	SFR	Single-family Residential
181	Congregate Seniors Housing	MFR	MFR	Multi-Family Residential
182	Continuing Care Retirement Community	MFR	MFR	Multi-Family Residential
183	Skilled Nursing Facility	COM	ELDER	Eldercare
184	Specialty Home (Developmentally Disable)	COM	ELDER	Eldercare
190	Medical Offices	COM	C-OFF	Commercial Office
191	Dental Offices	COM	C-OFF	Commercial Office
192	Medical Dental Complex	COM	C-MED	Commercial Medical
193	Veterinary Hospitals	COM	C-HOS	Hospital
194	One-Story Office Condo	COM	C-OFF	Commercial Office
195	Two-Story Office Condo	COM	C-OFF	Commercial Office
196	Medical Office Condo	COM	C-OFF	Commercial Office
197	Dental Office Condo	COM	C-RET	Commercial Retail
200	Commercial Common Area – Non Shopping C	COM	C-RET	Commercial Retail
201	Miscellaneous Multiple Uses – None Fully Dominant	COM	MISC-COM	Miscellaneous Commercial
202	Commercial Use	COM	MISC-COM	Miscellaneous Commercial
203	Animal Training Facility	COM	MISC-COM	Miscellaneous Commercial
204	Day Care Center	COM	DAYCARE	Daycare
210	Restaurants	COM	C-REST	Commercial Restaurants
211	Fast Food Restaurants	COM	C-RESTFF	Commercial Fast Food Rest
212	Food Preparation – Take Out Only	COM	C-FOOD	Commercial Food-Retail
213	Cocktail Lounge – Bars	COM	C-REST	Commercial Restaurants

Table A-12. San Joaquin County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
214	Restaurant with Residential Unit or Units	COM	C-REST	Commercial Restaurants
230	Walk-In Theaters	PUB	P-REC	Public Recreation/Assembly
231	Multiple Screen Theaters	PUB	P-REC	Public Recreation/Assembly
240	Banks	COM	C-RET	Commercial Retail
250	Full Service Stations	COM	C-SERV	Commercial Service-Auto
251	Self Service. Station (has no facilities)	COM	C-SERV	Commercial Service-Auto
252	Service Station with Car Wash	COM	C-SERV	Commercial Service-Auto
253	Truck Terminals	IND	I-WH	Industrial Warehouse
254	Bulk Plants	IND	I-WH	Industrial Warehouse
255	Self Service Station with Mini Mart	COM	C-SERV	Commercial Service-Auto
256	Convenience Store (mini-mart) with gas station	COM	C-SERV	Commercial Service-Auto
260	Auto Sales with Service Center	COM	C-AUTO	Commercial Auto Sales
261	Auto Sales without Service Center	COM	C-AUTO	Commercial Auto Sales
262	Used Car Lot	COM	C-AUTO	Commercial Auto Sales
263	Other Sales Centers (Trailers, mobile home	COM	C-AUTO	Commercial Auto Sales
270	Farm or CONTS. Machine Sales and Service	FARM	FARM	Farm Buildings Including Primary RES Residence
271	Farm or CONTS. Machine Sales Only	FARM	FARM	Farm Buildings Including Primary Residence
272	Farm or CONST. Machine Sales Only	FARM	FARM	Farm Buildings Including Primary Residence
280	Auto and Truck Repairs and Accessories	COM	C-SERV	Commercial Service-Auto
281	Specialty Shops (Tires, Brakes, Etc.)	COM	C-SERV	Commercial Service-Auto
282	Car Wash	COM	C-SERV	Commercial Service-Auto
283	Self Service Car Wash	COM	C-SERV	Commercial Service-Auto
284	Laundry	COM	C-RET	Commercial Retail
285	Auto Body Shop	COM	C-SERV	Commercial Service-Auto
290	Retail Nursery	COM	C-RET	Commercial Retail
291	Commercial/Wholesale Nursery	COM	C-RET	Commercial Retail
300	Vacant Industrial Land Undeveloped	IND	I-LT	Industrial Light
301	Vacant Industrial Land – Developed With	IND	I-LT	Industrial Light

Table A-12. San Joaquin County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
302	Vacant Industrial Land with Miscellaneous IMPS	IND	I-LT	Industrial Light
307	Potential Industrial Subdivision	IND	I-LT	Industrial Light
310	Light Manufacturing and Light Industrial	IND	I-LT	Industrial Light
311	Light Industrial and Warehousing	IND	I-LT	Industrial Light
312	Light Industrial Warehouse Multiple Tenants	IND	I-LT	Industrial Light
313	Industrial Condo	MFR	MFR	Multi-Family Residential
314	Shop-Work Area with Small Office	COM	C-RET	Commercial Retail
320	Warehousing – Active	IND	I-WH	Industrial Warehouse
321	Warehousing – Inactive	IND	I-WH	Industrial Warehouse
323	Warehousing – Yard	IND	I-WH	Industrial Warehouse
324	Mini Storage Warehousing	IND	I-WH	Industrial Warehouse
330	Lumber Mills	IND	I-LT	Industrial Light
331	Retail Lumber Yards	IND	I-LT	Industrial Light
332	Specialty Lumber Products (Mouldings, SA	IND	I-LT	Industrial Light
340	Packing Plants	IND	I-LT	Industrial Light
341	Cold Storage or Refrigerated Warehouse	IND	I-LT	Industrial Light
350	Fruit and Vegetable	IND	I-LT	Industrial Light
351	Meat Products	IND	I-LT	Industrial Light
352	Large Winery	IND	I-LT	Industrial Light
353	Small/Boutique Winery	COM	C-RET	Commercial Retail
355	Other Food Processing	IND	I-LT	Industrial Light
360	Feed and Grain Mills	IND	I-LT	Industrial Light
361	Retail Feed and Grain Sales	IND	I-LT	Industrial Light
362	Stockyards	IND	I-LT	Industrial Light
363	AG Chemical Sales and/or Application	IND	I-LT	Industrial Light
370	Heavy Industry	IND	I-HV	Industrial Heavy Manufacture
371	Shipyard	IND	I-HV	Industrial Heavy Manufacture
380	Mineral Processing	IND	I-HV	Industrial Heavy Manufacture
381	Sand and Gravel – Shale	MISC	MISC	Miscellaneous
390	Industrial Common Area	IND	I-LT	Industrial Light
391	Miscellaneous Industrial Multiple Uses – None Full	IND	I-LT	Industrial Light

Table A-12. San Joaquin County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
392	Industrial Use (doesn't reasonably fit any	IND	I-LT	Industrial Light
393	Airport (private	PUB	AIR	Airport
400	Irrigated Orchard	CROP	CROP	Crops
401	Irrigated Orchard with Residence	FARM	FARM	Farm Buildings Including Primary RES Residence
420	Irrigated Vineyard	CROP	CROP	Crops
421	Irrigated Vineyard with Residence	FARM	FARM	Farm Buildings Including Primary Residence
450	Irrigated Row Crops	CROP	CROP	Crops
451	Irrigated Row Crops with Residence	FARM	FARM	Farm Buildings Including Primary Residence
460	Irrigated Pasture	CROP	CROP	Crops
461	Irrigated Pasture with Residence	FARM	FARM	Farm Buildings Including Primary Residence
462	Horse Ranch	CROP	CROP	Crops
463	Horse Ranch with Residence	FARM	FARM	Farm Buildings Including Primary Residence
470	Dairy	IND	I-LT	Industrial Light
471	Dairy with Residence	FARM	FARM	Farm Buildings Including Primary Residence
480	Poultry Ranch	CROP	CROP	Crops
481	Poultry Ranch with Residence	FARM	FARM	Farm Buildings Including Primary Residence
490	Feed Lots	MISC	MISC	Miscellaneous
500	Dry Farm	CROP	CROP	Crops
501	Dry Farm with Residence	FARM	FARM	Farm Buildings Including Primary Residence
510	Dry Graze	CROP	CROP	Crops
511	Dry Graze with Residence	FARM	FARM	Farm Buildings Including Primary Residence
520	Non-Irrigated Vineyards	CROP	CROP	Crops
521	Non-Irrigated Vineyards with Residence	FARM	FARM	Farm Buildings Including Primary RES Residence
530	Specialty Farms	CROP	CROP	Crops
550	Tree Farm	CROP	CROP	Crops
551	Tree Farm (with or without residence)	FARM	FARM	Farm Buildings Including Primary Residence
590	Waste Lands	MISC	MISC	Miscellaneous
591	Berms	MISC	MISC	Miscellaneous
610	Swim Centers	PUB	P-REC	Public Recreation/Assembly

Table A-12. San Joaquin County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
611	Recreational Centers	PUB	P-REC	Public Recreation/Assembly
612	Marina or Yachting Club	PUB	PORT	Ports
613	Racquetball Club	PUB	P-REC	Public Recreation/Assembly
614	Tennis Club	PUB	P-REC	Public Recreation/Assembly
615	Private Campground or Resort	PUB	P-REC	Public Recreation/Assembly
620	Privately Owned Dance Halls	PUB	P-REC	Public Recreation/Assembly
630	Bowling Alleys	PUB	P-REC	Public Recreation/Assembly
631	Arcades and Amusement Centers	PUB	P-REC	Public Recreation/Assembly
632	Skating Rink	PUB	P-REC	Public Recreation/Assembly
640	Clubs, Lodge Halls	PUB	P-REC	Public Recreation/Assembly
650	Privately Owned Auditoriums and Stadiums	PUB	P-REC	Public Recreation/Assembly
660	18-Hole Public Golf Course	PUB	P-REC	Public Recreation/Assembly
661	9-Hole Public Golf Course	PUB	P-REC	Public Recreation/Assembly
662	Country Club	PUB	P-REC	Public Recreation/Assembly
664	Driving Range	PUB	P-REC	Public Recreation/Assembly
670	Privately Owned Race Tracks	PUB	P-REC	Public Recreation/Assembly
680	Non-Profit Organizations Camps (Boy Scouts, Etc.)	PUB	P-REC	Public Recreation/Assembly
690	Privately Owned Parks	PUB	P-REC	Public Recreation/Assembly
710	Church, Synagogue or Temple	PUB	P-GOV	Public Government Building
711	Other Church Property	PUB	P-GOV	Public Government Building
720	Private School	PUB	P-SCH	Public and Private Schools
721	Parochial School	PUB	P-SCH	Public and Private Schools
722	Special School	PUB	P-SCH	Public and Private Schools
730	Private Colleges	PUB	P-SCH	Public and Private Schools
740	Full Service Hospital	COM	C-HOS	Hospital
742	Clinic	COM	C-MED	Commercial Medical
760	Orphanages	MFR	MISC-MFR	Miscellaneous Residential
770	Cemeteries (non-profit)	MISC	MISC	Miscellaneous
771	Mortuaries and Funeral Homes	COM	C-MED	Commercial Medical
772	Cemetery Taxable (profit)	MISC	MISC	Miscellaneous
810	SBE valued	MISC	MISC	Miscellaneous
811	Utility Water Company	PUB	P-GOV	Public Government Building
812	Mutual Water Company	PUB	P-GOV	Public Government Building
813	Cable TV	PUB	P-GOV	Public Government Building
814	Radio and TV Broadcast Site	PUB	P-GOV	Public Government Building

Table A-12. San Joaquin County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
815	Pipeline Right-Of-Way	PUB	P-GOV	Public Government Building
850	Right-Of-Way	MISC	MISC	Miscellaneous
851	Private Road	MISC	MISC	Miscellaneous
860	Well Site	MISC	MISC	Miscellaneous
861	Tank Site	MISC	MISC	Miscellaneous
862	Springs and Other Water Sources	MISC	MISC	Miscellaneous
870	Rivers and Lakes	MISC	MISC	Miscellaneous
890	Parking Lots – Fee	MISC	MISC	Miscellaneous
891	Parking Lots – No Fee	MISC	MISC	Miscellaneous
892	Parking Garages	MISC	MISC	Miscellaneous
900	Vacant Federal Lands	MISC	MISC	Miscellaneous
901	Federal Buildings	PUB	P-GOV	Public Government Building
902	Military Installation	PUB	P-GOV	Public Government Building
903	Miscellaneous Federal Property	PUB	P-GOV	Public Government Building
910	Vacant State Lands	MISC	MISC	Misc Miscellaneous
911	State Buildings	PUB	P-GOV	Public Government Building
913	State Parks and Other Recreational Facilities	PUB	P-REC	Public Recreation/Assembly
914	State Schools, Colleges	PUB	P-SCH	Public and Private Schools
916	Miscellaneous State Property	PUB	P-GOV	Public Government Building
920	Vacant County Land	Misc	MISC	Misc Miscellaneous
921	County Buildings	PUB	P-GOV	Public Government Building
923	County Parks and Other Recreational Facilities	PUB	P-REC	Public Recreation/Assembly
924	County Hospitals	COM	C-HOS	Hospital
925	Miscellaneous County Property	PUB	P-GOV	Public Government Building
930	Vacant City Lands	PUB	P-GOV	Public Government Building
931	City Buildings	PUB	P-GOV	Public Government Building
932	City Shops and Yard	PUB	P-GOV	Public Government Building
933	City Parks and Other Recreational Facilities	PUB	P-REC	Public Recreation/Assembly
934	Municipal Utility Prop. (reservoirs, sewer pipeline)	PUB	P-GOV	Public Government Building
935	Parking Lots – Garages	IND	I-WH	Industrial Warehouse
936	Municipal Airports	PUB	AIR	Airport
937	Miscellaneous City Property	PUB	MISC-PUB	Miscellaneous Public/Government
940	School District Properties	PUB	P-SCH	Public and Private Schools
941	Fire Districts	PUB	FIRE	Fire station

Table A-12. San Joaquin County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
942	Flood Control District Property	PUB	P-GOV	Public Government Building
943	Water District Property	PUB	P-GOV	Public Government Building
944	Miscellaneous District property	PUB	P-GOV	Public Government Building
950	Public Owned Land – Non-Taxable	PUB	P-GOV	Public Government Building
951	Public Owned Land – Taxable [Section 11]	PUB	P-GOV	Public Government Building
931	City Buildings	PUB	P-GOV	Public Government Building
932	City Shops and Yard	PUB	P-GOV	Public Government Building
933	City Parks and Other Recreational Facilities	PUB	P-REC	Public Recreation/Assembly
934	Municipal Utility property (reservoirs, sewer pipeline)	PUB	P-GOV	Public Government Building
935	Parking Lots – Garages	IND	I-WH	Industrial Warehouse
936	Municipal Airports	PUB	AIR	Airport
937	Miscellaneous City Property	PUB	MISC-PUB	Miscellaneous Public/Government
940	School District Properties	PUB	P-SCH	Public and Private Schools
941	Fire Districts	PUB	FIRE	Fire station
942	Flood Control District Property	PUB	P-GOV	Public Government Building
943	Water District Property	PUB	P-GOV	Public Government Building
944	Miscellaneous District property	PUB	P-GOV	Public Government Building
950	Public Owned Land – Non-Taxable	PUB	P-GOV	Public Government Building
951	Public Owned Land – Taxable (Section 11)	PUB	P-GOV	Public Government Building
931	City Buildings	PUB	P-GOV	Public Government Building
932	City Shops and Yard	PUB	P-GOV	Public Government Building
933	City Parks and Other Recreational Facilities	PUB	P-REC	Public Recreation/Assembly
934	Municipal Utility Property (reservoirs, sewer pipeline)	PUB	P-GOV	Public Government Building
935	Parking Lots – Garages	IND	I-WH	Industrial Warehouse
936	Municipal Airports	PUB	AIR	Airport
937	Miscellaneous City Property	PUB	MISC-PUB	Miscellaneous Public/Government
940	School District Properties	PUB	P-SCH	Public and Private Schools
941	Fire Districts	PUB	FIRE	Fire station
942	Flood Control District Property	PUB	P-GOV	Public Government Building
943	Water District Property	PUB	P-GOV	Public Government Building
944	Miscellaneous District property	PUB	P-GOV	Public Government Building

Table A-12. San Joaquin County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
950	Public Owned Land – Non-Taxable	PUB	P-GOV	Public Government Building
951	Public Owned Land – Taxable (Section 11)	PUB	P-GOV	Public Government Building

Table A-13. Solano County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
1000	Improved single-family residential properties	SFR	SFR	Single-family Residential
1100	Vacant single-family residential properties	SFR	SFR	Single-family Residential
1500	Single-family condominiums	SFR	SFR	Single-family Residential
2000	Vacant multiple residential land	MISC	MISC	Miscellaneous
2100	Improved multiple residential land	MISC	MISC	Miscellaneous
2700	Mobile home park	MH	MH	Mobile Home Single/Double
3000	Vacant commercial land	Misc	MISC	Miscellaneous
3100	Marinas	PUB	PORT	Ports
3400	Service stations	COM	C-SERV	Commercial Service-Auto
3500	Commercial sales and services	COM	C-RET	Commercial Retail
3800	Hotels and motels	COM	C-HOTEL	Hotel
4000	Vacant industrial land	MISC	MISC	Miscellaneous
4400	Manufacturing and warehousing	IND	I-LT	Industrial Light
5000	Agricultural property	FARM	FARM	Farm Buildings Including Primary Residence
6100	Definition Not Available	MISC	MISC	Miscellaneous
6400	Range and watershed	CROP	CROP	Crops
8100	Church properties	PUB	P-CH	Public Church
8200	Schools	PUB	P-SCH	Public and Private Schools
8300	Hospitals	COM	C-HOS	Hospital
8400	Cemeteries	MISC	MISC	Miscellaneous
8500	Cultural uses	PUB	P-REC	Public Recreation/Assembly
8700	Clubs and lodges	PUB	P-REC	Public Recreation/Assembly
9700	Taxable below minimum value	MISC	MISC	Miscellaneous
9800	Governmental and miscellaneous	PUB	P-GOV	Public Government Building

Table A-14. Stanislaus County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
010	Vacant R-1 – no higher use potential/Null (0,0,0)	MISC	MISC	Miscellaneous
020	Vacant R-2 – no higher use potential/Null (0,0,0)	MISC	MISC	Miscellaneous
030	Vacant R-3 – no higher use potential/Null (0,0,0)	MISC	MISC	Miscellaneous
040	Vacant PD – no higher use potential/Null (0,0,0)	MISC	MISC	Miscellaneous
050	Unassigned/Null (0,0,0)	MISC	MISC	Miscellaneous
060	Vacant/Null (0,0,0)	MISC	MISC	Miscellaneous
070	Vacant; Potential subdivision/Null (0,0,0)	MISC	MISC	Miscellaneous
075	Vacant; Potential subdivision/Trees and Vines on property. (0,T,0)	MISC	MISC	Miscellaneous
076	Vacant; Potential subdivision/Property is on the Williamson Act. (0,0,W)	MISC	MISC	Miscellaneous
080	Vacant; Higher use potential/Null (0,0,0)	MISC	MISC	Miscellaneous
090	Vacant; Miscellaneous various/Null (0,0,0)	MISC	MISC	Miscellaneous
101	Single-family residence – no higher potential, no added value items/Residential Living Unit of any type is on the property (R,0,0)	SFR	SFR	Single-family Residential
111	Single-family residence – same as “10” w/pool, spa, or hot tub/Residential Living Unit of any type is on the property (R,0,0)	SFR	SFR	Single-family Residential
121	Single-family residence – same as “10” or “11” w/additional value items/Residential Living Unit of any type is on the property (R,0,0)	SFR	SFR	Single-family Residential
122	Single-family residence – same as “10” or “11” w/additional value items/Residential Living Unit and has trees and vines. (R,T,0)	SFR	SFR	Single-family Residential
131	Condominium – and condo common area/Residential Living Unit of any type is on the property (R,0,0)	MFR	MFR	Multi-Family Residential
141	Mobile home site – developed/Residential Living Unit of any type is on the property (R,0,0)	MH	MH	Mobile Home Single/Double
160	Zero lot line (Gentry Plan) – also Zero lot line Common area/Null (0,0,0)	MISC	MISC	Miscellaneous

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
161	Zero lot line (Gentry Plan) – also Zero lot line Common area/Residential Living Unit of any type is on the property (R,0,0)	SFR	MISC-RES	Miscellaneous Residential
170	Underimproved or overimproved/Null (0,0,0)	SFR	MISC-RES	Miscellaneous Residential
171	Underimproved or overimproved/Residential Living Unit of any type is on the property (R,0,0)	SFR	SFR	Single-family Residential
181	Single-family – higher use potential/Residential Living Unit of any type is on the property (R,0,0)	SFR	SFR	Single-family Residential
190	Single-family – miscellaneous various - poor shape restricts /Null (0,0,0)	SFR	SFR	Single-family Residential
191	Single-family – miscellaneous various - poor shape restricts /Residential Living Unit of any type is on the property (R,0,0)	SFR	SFR	Single-family Residential
201	Duplex or triplex – no extra value items (pool, extra land, buildings)/Residential Living Unit of any type is on the property (R,0,0)	MFR	MFR	Multi-Family Residential
211	Duplex or triplex – with extra value items (pool, extra land, buildings)/Residential Living Unit of any type is on the property (R,0,0)	MFR	MFR	Multi-Family Residential
221	4 to 9 income units – may have pool, no significant excess land/Residential Living Unit of any type is on the property (R,0,0)	MFR	MFR	Multi-Family Residential
231	10 to 29 income units – same as 22/Residential Living Unit of any type is on the property (R,0,0)	MFR	MFR	Multi-Family Residential
241	30 or more income units – same as 22/Residential Living Unit of any type is on the property (R,0,0)	MFR	MFR	Multi-Family Residential
261	Non-uniform and mixed income units – 2 or more units, not owner occupied/Residential Living Unit of any type is on the property (R,0,0)	MFR	MFR	Multi-Family Residential
262	Non-uniform and mixed income units – 2 or more units, not owner occupied/Residential Living Unit and has trees and vines. (R,T,0)	MFR	MFR	Multi-Family Residential
270	Potential subdivision property/Null (0,0,0)	Misc	MISC	Miscellaneous

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
271	Potential subdivision property/Residential Living Unit of any type is on the property (R,0,0)	SFR	MISC-RES	Miscellaneous Residential
272	Potential subdivision property/Residential Living Unit and has trees and vines. (R,T,0)	SFR	MISC-RES	Miscellaneous Residential
273	Potential subdivision property/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	SFR	MISC-RES	Miscellaneous Residential
274	Potential subdivision property/Residential Living Unit, and is on the Williamson Act. (R,0,W)	SFR	MISC-RES	Miscellaneous Residential
275	Potential subdivision property/Trees and Vines on property. (0,T,0)	MISC	MISC	Miscellaneous
277	Potential subdivision property/Trees and Vines on property and is on the Williamson Act. (0,T,W)	MISC	MISC	Miscellaneous
281	Higher use potential property/Residential Living Unit of any type is on the property (R,0,0)	SFR	MISC-RES	Miscellaneous Residential
290	Miscellaneous improvements – various/Null (0,0,0)	MFR	MISC-MFR	Miscellaneous Residential
291	Miscellaneous improvements – various/Residential Living Unit of any type is on the property (R,0,0)	MFR	MISC-MFR	Miscellaneous Residential
300	Vacant – C1 zoning/Null (0,0,0)	MISC	MISC	Miscellaneous
310	Vacant – C2 zoning/Null (0,0,0)	MISC	MISC	Miscellaneous
320	Vacant – PD commercial/Null (0,0,0)	MISC	MISC	Miscellaneous
330	Vacant – H1 zoning/Null (0,0,0)	MISC	MISC	Miscellaneous
340	Vacant – M1, M2, or CM zoning/Null (0,0,0)	MISC	MISC	Miscellaneous
360	PD Office, AP, PO, PA/Null (0,0,0)	COM	C-OFF	Commercial Office
370	PD Industrial – PI/Null (0,0,0)	IND	I-LT	Industrial Light
380	Vacant – higher use potential/Null (0,0,0)	MISC	MISC	Miscellaneous
387	Vacant – higher use potential/Trees and Vines on property and is on the Williamson Act. (0,T,W)	MISC	MISC	Miscellaneous
390	Vacant – miscellaneous, mixed – mixtures of commercial and/or industrial/Null (0,0,0)	MISC	MISC	Miscellaneous
400	Commercial stores and shops/Null (0,0,0)	COM	C-SHOP	Commercial Shopping Center

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
401	Commercial stores and shops/Residential Living Unit of any type is on the property (R,0,0)	COM	C-SHOP	Commercial Shopping Center
410	Shopping centers/Null (0,0,0)	COM	C-SHOP	Commercial Shopping Center
411	Shopping centers/Residential Living Unit of any type is on the property (R,0,0)	COM	C-SHOP	Commercial Shopping Center
420	Mini-marts/Null (0,0,0)	COM	C-SHOP	Commercial Shopping Center
421	Mini-marts/Residential Living Unit of any type is on the property (R,0,0)	COM	C-FOOD	Commercial Food-Retail
430	Grocery stores/Null (0,0,0)	COM	C-GROC	Commercial Grocery Store
431	Grocery stores/Residential Living Unit of any type is on the property (R,0,0)	COM	C-GROC	Commercial Grocery Store
440	Auto sales and auto service centers/Null (0,0,0)	COM	C-AUTO	Commercial Auto Sales
441	Auto sales and auto service centers/Residential Living Unit of any type is on the property (R,0,0)	COM	C-AUTO	Commercial Auto Sales
460	Recreational properties/Null (0,0,0)	PUB	P-REC	Public Recreation/Assembly
461	Recreational properties/Residential Living Unit of any type is on the property (R,0,0)	PUB	P-REC	Public Recreation/Assembly
470	Gas stations and auto repair shops/Null (0,0,0)	COM	C-SERV	Commercial Service-Auto
471	Gas stations and auto repair shops/Residential Living Unit of any type is on the property (R,0,0)	COM	C-SERV	Commercial Service-Auto
480	Trailer parks/Null (0,0,0)	PUB	P-REC	Public Recreation/Assembly
481	Trailer parks/Residential Living Unit of any type is on the property (R,0,0)	MH	MH	Mobile Home Single/Double
490	Transitional commercial/Null (0,0,0)	COM	MISC-COM	Miscellaneous Commercial
491	Transitional commercial/Residential Living Unit of any type is on the property (R,0,0)	COM	MISC-COM	Miscellaneous Commercial
492	Transitional commercial/Residential Living Unit and has trees and vines. (R,T,0)	COM	MISC-COM	Miscellaneous Commercial
494	Transitional commercial/Residential Living Unit, and is on the Williamson Act. (R,0,W)	COM	MISC-COM	Miscellaneous Commercial

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
497	Transitional commercial/Trees and Vines on property and is on the Williamson Act. (0,T,W)	COM	MISC-COM	Miscellaneous Commercial
500	Restaurants and bars/Null (0,0,0)	COM	C-HOTEL	Hotel
501	Restaurants and bars/Residential Living Unit of any type is on the property (R,0,0)	COM	C-HOTEL	Hotel
510	Fast food/Null (0,0,0)	COM	C-RESTFF	Commercial Fast Food Rest
511	Fast food/Residential Living Unit of any type is on the property (R,0,0)	COM	C-RESTFF	Commercial Fast Food Rest
520	Office buildings/Null (0,0,0)	COM	C-OFF	Commercial Office
521	Office buildings/Residential Living Unit of any type is on the property (R,0,0)	COM	C-OFF	Commercial Office
522	Office buildings/Residential Living Unit and has trees and vines. (R,T,0)	COM	C-OFF	Commercial Office
530	Hotels and motels/Null (0,0,0)	COM	C-HOTEL	Hotel
531	Hotels and motels/Residential Living Unit of any type is on the property (R,0,0)	COM	C-HOTEL	Hotel
540	Banks and savings and loans/Null (0,0,0)	COM	C-RET	Commercial Retail
541	Banks and savings and loans/Residential Living Unit of any type is on the property (R,0,0)	COM	C-RET	Commercial Retail
560	Medical and dental offices/Null (0,0,0)	COM	C-MED	Commercial Medical
561	Medical and dental offices/Residential Living Unit of any type is on the property (R,0,0)	COM	C-MED	Commercial Medical
570	Hospital and convalescent hospitals/Null (0,0,0)	COM	C-HOS	Hospital
571	Hospital and convalescent hospitals/Residential Living Unit of any type is on the property (R,0,0)	COM	C-HOS	Hospital
580	Churches and fraternal organizations/Null (0,0,0)	PUB	P-CH	Public Church
581	Churches and fraternal organizations/Residential Living Unit of any type is on the property (R,0,0)	PUB	P-CH	Public Church

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
584	Churches and fraternal organizations/Residential Living Unit, and is on the Williamson Act. (R,0,W)	PUB	P-CH	Public Church
586	Churches and fraternal organizations/Property is on the Williamson Act. (0,0,W)	PUB	P-CH	Public Church
587	Churches and fraternal organizations/Trees and Vines on property and is on the Williamson Act. (0,T,W)	PUB	P-CH	Public Church
590	Miscellaneous – mixed commercial/Null (0,0,0)	COM	MISC-COM	Miscellaneous Commercial
591	Miscellaneous – mixed commercial/Residential Living Unit of any type is on the property (R,0,0)	COM	MISC-COM	Miscellaneous Commercial
592	Miscellaneous – mixed commercial/Residential Living Unit and has trees and vines. (R,T,0)	COM	MISC-COM	Miscellaneous Commercial
595	Miscellaneous – mixed commercial/Trees and Vines on property. (0,T,0)	COM	MISC-COM	Miscellaneous Commercial
596	Miscellaneous – mixed commercial/Property is on the Williamson Act. (0,0,W)	COM	MISC-COM	Miscellaneous Commercial
600	Farm and heavy equipment dealers and service centers/Null (0,0,0)	COM	C-SERV	Commercial Service-Auto
601	Farm and heavy equipment dealers and service centers/Residential Living Unit of any type is on the property (R,0,0)	COM	C-SERV	Commercial Service-Auto
610	Multi-use warehouses/Null (0,0,0)	IND	I-WH	Industrial Warehouse
611	Multi-use warehouses/Residential Living Unit of any type is on the property (R,0,0)	IND	I-WH	Industrial Warehouse
612	Multi-use warehouses/Residential Living Unit and has trees and vines. (R,T,0)	IND	I-WH	Industrial Warehouse
620	Mini-warehouses/Null (0,0,0)	IND	I-WH	Industrial Warehouse
621	Mini-warehouses/Residential Living Unit of any type is on the property (R,0,0)	IND	I-WH	Industrial Warehouse
630	Warehouses/Null (0,0,0)	IND	I-WH	Industrial Warehouse
631	Warehouses/Residential Living Unit of any type is on the property (R,0,0)	IND	I-WH	Industrial Warehouse

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
640	Light industrial/Null (0,0,0)	IND	I-LT	Industrial Light
641	Light industrial/Residential Living Unit of any type is on the property (R,0,0)	IND	I-LT	Industrial Light
660	Heavy industrial/Null (0,0,0)	IND	I-HV	Industrial Heavy Manufacture
661	Heavy industrial/Residential Living Unit of any type is on the property (R,0,0)	IND	I-HV	Industrial Heavy Manufacture
662	Heavy industrial/Residential Living Unit and has trees and vines. (R,T,0)	IND	I-HV	Industrial Heavy Manufacture
664	Heavy industrial/Residential Living Unit, and is on the Williamson Act. (R,0,W)	IND	I-HV	Industrial Heavy Manufacture
670	Food processing/Null (0,0,0)	IND	I-LT	Industrial Light
671	Food processing/Residential Living Unit of any type is on the property (R,0,0)	IND	I-LT	Industrial Light
674	Food processing/Residential Living Unit, and is on the Williamson Act. (R,0,W)	IND	I-LT	Industrial Light
680	Refrigerated warehouses/Null (0,0,0)	IND	I-WH	Industrial Warehouse
681	Refrigerated warehouses/Residential Living Unit of any type is on the property (R,0,0)	IND	I-WH	Industrial Warehouse
686	Refrigerated warehouses/Property is on the Williamson Act. (0,0,W)	IND	I-WH	Industrial Warehouse
690	Miscellaneous – mixed industrial/Null (0,0,0)	COM	MISC-COM	Miscellaneous Commercial
691	Miscellaneous – mixed industrial/Residential Living Unit of any type is on the property (R,0,0)	COM	MISC-COM	Miscellaneous Commercial
692	Miscellaneous – mixed industrial/Residential Living Unit and has trees and vines. (R,T,0)	COM	MISC-COM	Miscellaneous Commercial
695	Miscellaneous – mixed industrial/Trees and Vines on property. (0,T,0)	COM	MISC-COM	Miscellaneous Commercial
696	Miscellaneous – mixed industrial/Property is on the Williamson Act. (0,0,W)	COM	MISC-COM	Miscellaneous Commercial
700	Undeveloped residential site/Null (0,0,0)	SFR	MISC-RES	Miscellaneous Residential

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
706	Undeveloped residential site/Property is on the Williamson Act. (0,0,W)	SFR	MISC-RES	Miscellaneous Residential
707	Undeveloped residential site/Trees and Vines on property and is on the Williamson Act. (0,T,W)	SFR	MISC-RES	Miscellaneous Residential
710	Developed residential site/Null (0,0,0)	SFR	MISC-RES	Miscellaneous Residential
711	Developed residential site/Residential Living Unit of any type is on the property (R,0,0)	FARM	FARM	Farm Buildings Including Primary Residence
712	Developed residential site/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
713	Developed residential site/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
714	Developed residential site/Residential Living Unit, and is on the Williamson Act. (R,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
720	Irrigated open land farming/Null (0,0,0)	FARM	MISC-FARM	Miscellaneous Farm
721	Irrigated open land farming/Residential Living Unit of any type is on the property (R,0,0)	FARM	FARM	Farm Buildings Including Primary Residence
722	Irrigated open land farming/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
723	Irrigated open land farming/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
724	Irrigated open land farming/Residential Living Unit, and is on the Williamson Act. (R,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
726	Irrigated open land farming/Property is on the Williamson Act. (0,0,W)	FARM	FARM	Farm Buildings Including Primary RES
727	Irrigated open land farming/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
730	Dry open land farming/Null (0,0,0)	FARM	MISC-FARM	Miscellaneous Farm
731	Dry open land farming/Residential Living Unit of any type is on the property (R,0,0)	FARM	FARM	Farm Buildings Including Primary Residence

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
734	Dry open land farming/Residential Living Unit, and is on the Williamson Act. (R,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
736	Dry open land farming/Property is on the Williamson Act. (0,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
740	Combination dry and irrigated farming/Null (0,0,0)	FARM	MISC-FARM	Miscellaneous Farm
741	Combination dry and irrigated farming/Residential Living Unit of any type is on the property (R,0,0)	FARM	FARM	Farm Buildings Including Primary Residence
742	Combination dry and irrigated farming/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
743	Combination dry and irrigated farming/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
744	Combination dry and irrigated farming/Residential Living Unit, and is on the Williamson Act. (R,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
746	Combination dry and irrigated farming/Property is on the Williamson Act. (0,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
747	Combination dry and irrigated farming/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
762	Vineyard/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
763	Vineyard/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
765	Vineyard/Trees and Vines on property. (0,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
767	Vineyard/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
770	Chicken ranch (egg or meat)/Null (0,0,0)	FARM	FARM	Farm Buildings Including Primary Residence
771	Chicken ranch (egg or meat)/Residential Living Unit of any type is on the property (R,0,0)	FARM	FARM	Farm Buildings Including Primary Residence
772	Chicken ranch (egg or meat)/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
773	Chicken ranch (egg or meat)/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
774	Chicken ranch (egg or meat)/Residential Living Unit, and is on the Williamson Act. (R,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
776	Chicken ranch (egg or meat)/Property is on the Williamson Act. (0,0,W)	FARM	FARM	Farm Buildings Including Primary RES
781	Turkey ranch (egg or meat)/Residential Living Unit of any type is on the property (R,0,0)	FARM	FARM	Farm Buildings Including Primary Residence
783	Turkey ranch (egg or meat)/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
784	Turkey ranch (egg or meat)/Residential Living Unit, and is on the Williamson Act. (R,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
786	Turkey ranch (egg or meat)/Property is on the Williamson Act. (0,0,W)	IND	I-LT	Industrial Light
793	Unassigned/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	MISC-FARM	Miscellaneous Farm
794	Unassigned/Residential Living Unit, and is on the Williamson Act. (R,0,W)	FARM	MISC-FARM	Miscellaneous Farm
796	Unassigned/Property is on the Williamson Act. (0,0,W)	FARM	MISC-FARM	Miscellaneous Farm
797	Unassigned/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	MISC-FARM	Miscellaneous Farm
802	Walnut orchard/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
803	Walnut orchard/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
805	Walnut orchard/Trees and Vines on property. (0,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
807	Walnut orchard/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
812	Almond orchard/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
813	Almond orchard/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
815	Almond orchard/Trees and Vines on property. (0,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
817	Almond orchard/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
822	Peach orchard/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
823	Peach orchard/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
825	Peach orchard/Trees and Vines on property. (0,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
827	Peach orchard/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
832	Apricot orchard/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
833	Apricot orchard/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
835	Apricot orchard/Trees and Vines on property. (0,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
837	Apricot orchard/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
842	Miscellaneous vines and orchard/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
843	Miscellaneous vines and orchard/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
845	Miscellaneous vines and orchard/Trees and Vines on property. (0,T,0)	FARM	MISC-FARM	Miscellaneous Farm
847	Miscellaneous vines and orchard/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	MISC-FARM	Miscellaneous Farm

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
862	Mixed growing improvements/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
863	Mixed growing improvements/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
865	Mixed growing improvements/Trees and Vines on property. (0,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
867	Mixed growing improvements/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
870	Dairy (all types/Null (0,0,0)	IND	I-LT	Industrial Light
871	Dairy (all types/Residential Living Unit of any type is on the property (R,0,0)	FARM	FARM	Farm Buildings Including Primary Residence
872	Dairy (all types/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
873	Dairy (all types/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
874	Dairy (all types/Residential Living Unit, and is on the Williamson Act. (R,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
876	Dairy (all types/Property is on the Williamson Act. (0,0,W)	IND	I-LT	Industrial Light
880	Higher potential use (rural)/Null (0,0,0)	FARM	MISC-FARM	Miscellaneous Farm
881	Higher potential use (rural)/Residential Living Unit of any type is on the property (R,0,0)	FARM	FARM	Farm Buildings Including Primary Residence
882	Higher potential use (rural)/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
883	Higher potential use (rural)/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
884	Higher potential use (rural)/Residential Living Unit, and is on the Williamson Act. (R,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
885	Higher potential use (rural)/Trees and Vines on property. (0,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
886	Higher potential use (rural)/Property is on the Williamson Act. (0,0,W)	FARM	FARM	Farm Buildings Including Primary Residence

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
887	Higher potential use (rural)/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
890	Miscellaneous rural/Null (0,0,0)	FARM	MISC-FARM	Miscellaneous Farm
891	Miscellaneous rural/Residential Living Unit of any type is on the property (R,0,0)	FARM	FARM	Farm Buildings Including Primary Residence
892	Miscellaneous rural/Residential Living Unit and has trees and vines. (R,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
893	Miscellaneous rural/Residential Living Unit, has trees and vines and is on the Williamson Act. (R,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
894	Miscellaneous rural/Residential Living Unit, and is on the Williamson Act. (R,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
895	Miscellaneous rural/Trees and Vines on property. (0,T,0)	FARM	FARM	Farm Buildings Including Primary Residence
896	Miscellaneous rural/Property is on the Williamson Act. (0,0,W)	FARM	FARM	Farm Buildings Including Primary Residence
897	Miscellaneous rural/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
900	All Cities/Null (0,0,0)	PUB	P-GOV	Public Government Building
906	All Cities/Property is on the Williamson Act. (0,0,W)	PUB	P-GOV	Public Government Building
910	Stanislaus county/Null (0,0,0)	PUB	P-GOV	Public Government Building
920	State of California/Null (0,0,0)	PUB	P-GOV	Public Government Building
930	United States/Null (0,0,0)	PUB	P-GOV	Public Government Building
940	All irrigation districts/Null (0,0,0)	Misc	MISC	Miscellaneous
941	All irrigation districts/Residential Living Unit of any type is on the property (R,0,0)	SFR	MISC-RES	Miscellaneous Residential
950	All public schools/Null (0,0,0)	PUB	P-SCH	Public and Private Schools
960	All housing authorities/Null (0,0,0)	MFR	MFR	Multi-Family Residential
961	All housing authorities/Residential Living Unit of any type is on the property (R,0,0)	MFR	MFR	Multi-Family Residential
970	Railroad properties/Null (0,0,0)	PUB	P-GOV	Public Government Building
980	Utilities/Null (0,0,0)	COM	C-OFF	Commercial Office
990	“File 13” individuals, cemeteries, fire departments, all others/Null (0,0,0)	PUB	FIRE	Fire station

Table A-14. Stanislaus County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
897	Miscellaneous rural/Trees and Vines on property and is on the Williamson Act. (0,T,W)	FARM	FARM	Farm Buildings Including Primary Residence
900	All Cities/Null (0,0,0)	PUB	P-GOV	Public Government Building
906	All Cities/Property is on the Williamson Act. (0,0,W)	PUB	P-GOV	Public Government Building
910	Stanislaus county/Null (0,0,0)	PUB	P-GOV	Public Government Building
920	State of California/Null (0,0,0)	PUB	P-GOV	Public Government Building
930	United States/Null (0,0,0)	PUB	P-GOV	Public Government Building
940	All irrigation districts/Null (0,0,0)	MISC	MISC	Miscellaneous
941	All irrigation districts/Residential Living Unit of any type is on the property (R,0,0)	SFR	MISC-RES	Miscellaneous Residential
950	All public schools/Null (0,0,0)	PUB	P-SCH	Public and Private Schools
960	All housing authorities/Null (0,0,0)	MFR	MFR	Multi-Family Residential
961	All housing authorities/Residential Living Unit of any type is on the property (R,0,0)	MFR	MFR	Multi-Family Residential
970	Railroad properties/Null (0,0,0)	PUB	P-GOV	Public Government Building
980	Utilities/Null (0,0,0)	COM	C-OFF	Commercial Office
990	“File 13” individuals, cemeteries, fire departments, all others/Null (0,0,0)	PUB	FIRE	Fire station

Table A-15. Sutter County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
000-***	Institutional	PUB	MISC-PUB	Miscellaneous Public/Government
010-***	Lodge building/club house or school building	PUB	P-REC	Public Recreation/Assembly
011-***	Privately owned schools	PUB	P-SCH	Public and Private Schools
020-***	Funeral homes or mortuary	COM	C-MED	Commercial Medical
030-***	Churches and temples	PUB	P-CH	Public Church
040-***	Cemetery or mausoleum	Misc	MISC	Miscellaneous
050-***	Government taxable	PUB	P-GOV	Public Government Building
060-***	Government non-taxable	PUB	P-GOV	Public Government Building
070-***	Manufactured home lots with licensed mobile homes	MH	MH	Mobile Home Single/Double
080-***	Vacant R-2	Misc	MISC	Miscellaneous
090-***	Vacant R-3 and R-4	Misc	MISC	Miscellaneous
100-***	Vacant R-1	Misc	MISC	Miscellaneous
120-***	Improved residence	SFR	SFR	Single-family Residential
130-***	Two (2) single-family residences	MFR	MFR	Multi-Family Residential
140-***	Multi-family residence	MFR	MFR	Multi-Family Residential
170-***	Multi-family residence - Apart/single 3 units	MFR	MFR	Multi-Family Residential
180-***	Single-family residence - Halfplexes	SFR	SFR	Single-family Residential
190-***	Single-family residence - Condominium	SFR	SFR	Single-family Residential
200-***	Open land over 15 acres – no SFR	CROP	MISC-AG	Miscellaneous Agriculture
201-***	Open land over 15 acres with one (1) SFR	FARM	FARM	Farm Buildings Including Primary Residence
202-***	Open land over 15 acres with two (2) SFR	MFR	MFR	Multi-Family Residential
220-***	Home site or small ranch under 15 acres – no SFR	CROP	MISC-AG	Miscellaneous Agriculture
221-***	Home site or small ranch under 15 acres with one (1) SFR	FARM	FARM	Farm Buildings Including Primary Residence
222-***	Home site or small ranch under 15 acres with two (2) SFR	MFR	MFR	Multi-Family Residential
223-***	Home site or small ranch under 15 acres with three (3) SFR	MFR	MFR	Multi-Family Residential

Table A-15. Sutter County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
224-***	Home site or small ranch under 15 acres with four (4) SFR	MFR	MFR	Multi-Family Residential
230-***	Orchard over 15 acres – no SFR	CROP	MISC-AG	Miscellaneous Agriculture
231-***	Orchard over 15 acres with one (1) SFR	FARM	FARM	Farm Buildings Including Primary Residence
232-***	Orchard over 15 acres with two (2) SFR	MFR	MFR	Multi-Family Residential
233-***	Orchard over 15 acres with three (3) SFR	MFR	MFR	Multi-Family Residential
234-***	Orchard over 15 acres with four (4) SFR	MFR	MFR	Multi-Family Residential
235-***	Orchard over 15 acres with five (5) SFR and greater	MFR	MFR	Multi-Family Residential
240-7**	Ag business – vacant land or orchard – no SFR	CROP	MISC-AG	Miscellaneous Agriculture
241-7**	Ag business – orchard with one (1) SFR	FARM	FARM	Farm Buildings Including Primary Residence
260-***	Dry farming or grazing land	FARM	MISC-FARM	Miscellaneous Farm
280-***	Duck clubs	FARM	FARM	Farm Buildings Including Primary Residence
290-***	Horse stables	FARM	FARM	Farm Buildings Including Primary Residence
300-***	Vacant commercial land	Misc	MISC	Miscellaneous
310-***	Improved commercial – store type	COM	C-RET	Commercial Retail
311-***	Improved commercial – service type	COM	C-SERV	Commercial Service-Auto
320-***	Improved commercial – shopping center	COM	C-SHOP	Commercial Shopping Center
321-***	Restaurant/bars	COM	C-REST	Commercial Restaurants
322-***	Fast food restaurant	COM	C-RESTFF	Commercial Fast Food Restaurant
329-***	Medical building	COM	C-MED	Commercial Medical
330-***	Office building	COM	C-OFF	Commercial Office
331-***	Mixed use	COM	C-OFF	Commercial Office
332-***	Mini-storage building	IND	I-WH	Industrial Warehouse
333-***	Mini-mart-gas	COM	C-FOOD	Commercial Food-Retail
334-***	Small grocery store	COM	C-FOOD	Commercial Food-Retail
335-***	Misc. and special use	COM	MISC-COM	Miscellaneous Commercial
340-***	Auto services	COM	C-AUTO	Commercial Auto Sales

Table A-15. Sutter County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
350-***	Motels	COM	C-HOTEL	Hotel
360-***	Mobile home parks	MH	MH	Mobile Home Single/Double
370-***	Rest homes/skilled nursing	COM	ELDER	Eldercare
375-7**	Rice dryers	IND	I-LT	Industrial Light
380-***	Marinas	PUB	PORT	Ports
390-***	Hospitals	COM	C-HOS	Hospital
400-***	Vacant industrial land	Misc	MISC	Miscellaneous
410-***	Improved industrial land	IND	MISC-IND	Miscellaneous Industrial
415-***	Steel buildings	COM	C-OFF	Commercial Office
420-***	Airport, crop dusting	PUB	AIR	Airport
430-***	Mines and quarries	IND	I-HV	Industrial Heavy Manufacture
600-***	Recreational	PUB	P-REC	Public Recreation/Assembly
610-***	Water companies	PUB	P-GOV	Public Government Building
700-***	Gas wells	IND	I-HV	Industrial Heavy Manufacture
LLL-LLL	Temporary Code	Misc	MISC	Miscellaneous
MH0-***	Manufactured Homes	MH	MH	Mobile Home Single/Double

Table A-16. Tehama County Land Use Codes

Due to its size the Land Use Codes for Tehama County will not be included. The Land Use Codes will be available electronically upon request.

Table A-17. Yolo County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
010	Single-family Residence	SFR	SFR	Single-family Residential
011	Condominium Unit	MFR	MFR	Multi-Family Residential
012	Condominium Unit	MFR	MFR	Single-family Residential
013	SFR (non-confirm)	SFR	SFR	Single-family Residential
014	(2nd use)	SFR	SFR	Single-family Residential
015	SFR lot w/miscellaneous improvements	SFR	SFR	Single-family Residential
016	SFR attached	SFR	SFR	Single-family Residential
017	Mobile home	MH	MH	Mobile Home Single/Double
018	Co-op housing	MFR	MFR	Multi-Family Residential
019	Identifier	SFR	SFR	Single-family Residential
020	1 duplex – 1 building	MFR	MFR	Multi-Family Residential
021	2 single-family residence – 1 lot	MFR	MFR	Multi-Family Residential
029	Identifier	MFR	MFR	Multi-Family Residential
030	1 triplex – 3 units in 1 building	MFR	MFR	Multi-Family Residential
031	3 units - 2 or more buildings	MFR	MFR	Multi-Family Residential
032	Single fourplex	MFR	MFR	Multi-Family Residential
033	4 units – 2 or more buildings	MFR	MFR	Multi-Family Residential
080	Common area no structures	Misc	MISC	Miscellaneous
081	Common area with structures	PUB	P-REC	Public Recreation/Assembly
082	Green belt	SFR	MISC-RES	Miscellaneous Residential
089	Identifier	Misc	MISC	Miscellaneous
110	Single story store	COM	C-SHOP	Commercial Shopping Center
111	Multiple story store	COM	C-SHOP	Commercial Shopping Center
112	Multiple store – 1 building	COM	C-SHOP	Commercial Shopping Center
113	Store with residential unit	COM	C-SHOP	Commercial Shopping Center
114	Store with residential unit	COM	C-SHOP	Commercial Shopping Center
119	Identifier	COM	C-SHOP	Commercial Shopping Center
120	1 store – 1 office	COM	C-OFF	Commercial Office
121	Combo stores/offices	COM	C-OFF	Commercial Office
122	Combo stores/offices/residential	COM	C-OFF	Commercial Office
129	Identifier	COM	C-SHOP	Commercial Shopping Center
130	One story	COM	C-SHOP	Commercial Shopping Center
140	Small Food	COM	C-GROC	Commercial Grocery Store
141	Supermarkets	COM	C-SHOP	Commercial Shopping Center
142	Outlying food stores	COM	C-GROC	Commercial Grocery Store

Table A-17. Yolo County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
149	Identifier	COM	C-GROC	Commercial Grocery Store
150	Outlying	COM	C-SHOP	Commercial Shopping Center
151	In commercial area	COM	C-SHOP	Commercial Shopping Center
159	Identifier	COM	C-SHOP	Commercial Shopping Center
160	5-10 Residential Units	MFR	MFR	Multi-Family Residential
161	11-20 Residential Units	MFR	MFR	Multi-Family Residential
162	21-40 Residential Units	MFR	MFR	Multi-Family Residential
163	41-100 Residential Units	MFR	MFR	Multi-Family Residential
164	100+ Residential Units	MFR	MFR	Multi-Family Residential
165	5+ Residential Nature	MFR	MFR	Multi-Family Residential
166	Rooming house, dorm, frat, sorority	MFR	MFR	Multi-Family Residential
169	Identifier	MFR	MFR	Multi-Family Residential
170	One story	COM	C-OFF	Commercial Office
171	Two story	COM	C-OFF	Commercial Office
172	3+ stories	COM	C-OFF	Commercial Office
173	Converted residence	COM	C-OFF	Commercial Office
179	Identifier	COM	C-OFF	Commercial Office
179	Identifier	COM	C-OFF	Commercial Office
180	Banks	COM	C-RET	Commercial Retail
181	Savings and Loans	COM	C-RET	Commercial Retail
189	Identifier	COM	C-RET	Commercial Retail
190	Medical Offices	COM	C-MED	Commercial Medical
191	Dental Offices	COM	C-MED	Commercial Medical
192	Medical-Dental Complex	COM	C-MED	Commercial Medical
193	Veterinary hospital	COM	C-HOS	Hospital
199	Identifier	COM	C-OFF	Commercial Office
200	Commercial common area	COM	MISC-COM	Miscellaneous Commercial
201	Parking lot – fee	COM	MISC-COM	Miscellaneous Commercial
202	Parking lot – no fee	COM	MISC-COM	Miscellaneous Commercial
203	Parking lot – garage	COM	MISC-COM	Miscellaneous Commercial
204	Parking lot – garage	COM	MISC-COM	Miscellaneous Commercial
205	Parking lot – garage	COM	MISC-COM	Miscellaneous Commercial
209	Identifier	COM	MISC-COM	Miscellaneous Commercial
210	Restaurant	COM	C-FOOD	Commercial Food-Retail
211	Drive-in and Fast food	COM	C-RESTFF	Commercial Fast Food Rest
212	Coffee shop	COM	C-FOOD	Commercial Food-Retail
213	Cocktail lounge-bar	COM	C-FOOD	Commercial Food-Retail

Table A-17. Yolo County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
214	Combination	COM	C-HOTEL	Hotel
219	Identifier	COM	C-REST	Commercial Restaurants
220	Mobile home park	MH	MH	Mobile Home Single/Double
221	Overnight park	MH	MH	Mobile Home Single/Double
222	MHP with overnight facility	MH	MH	Mobile Home Single/Double
223	Resort type park	COM	C-HOTEL	Hotel
229	Identifier	MH	MH	Mobile Home Single/Double
230	<30 units	COM	C-HOTEL	Hotel
231	31+ units	COM	C-HOTEL	Hotel
232	<30 units with kitchen	COM	C-HOTEL	Hotel
233	31+ units with kitchen	COM	C-HOTEL	Hotel
234	<30 units with shops and restaurant	COM	C-HOTEL	Hotel
235	31+ units with shops and restaurant	COM	C-HOTEL	Hotel
236	Resort motels (cabins, etc.)	COM	C-HOTEL	Hotel
239	Identifier	COM	C-HOTEL	Hotel
240	Hotel without restaurant	COM	C-HOTEL	Hotel
241	Hotel with restaurant	COM	C-HOTEL	Hotel
249	Identifier	COM	C-HOTEL	Hotel
250	Full Service Station	COM	C-SERV	Commercial Service-Auto
251	Self-serve (pumps only)	COM	C-SERV	Commercial Service-Auto
252	Station w/car wash	COM	C-SERV	Commercial Service-Auto
253	Truck terminal	COM	C-SERV	Commercial Service-Auto
254	Bulk plant	COM	C-SERV	Commercial Service-Auto
259	Identifier	COM	C-SERV	Commercial Service-Auto
260	w/service center	COM	C-AUTO	Commercial Auto Sales
261	w/o service center	COM	C-AUTO	Commercial Auto Sales
262	Other sales center	COM	C-AUTO	Commercial Auto Sales
270	Sales and/or Service	COM	C-AUTO	Commercial Auto Sales
279	Identifier	COM	C-AUTO	Commercial Auto Sales
280	Auto and truck repairs	COM	C-AUTO	Commercial Auto Sales
281	Specialty shops	COM	C-AUTO	Commercial Auto Sales
282	Car Wash	COM	C-SERV	Commercial Service-Auto
283	Self-service car wash	COM	C-SERV	Commercial Service-Auto
284	Auto wreckers	COM	C-SERV	Commercial Service-Auto
289	Identifier	COM	C-SERV	Commercial Service-Auto
290	Retail	COM	C-RET	Commercial Retail

Table A-17. Yolo County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
291	Wholesale	COM	C-RET	Commercial Retail
299	Identifier	COM	C-SHOP	Commercial Shopping Center
310	and Light industrial	IND	I-LT	Industrial Light
311	and Warehousing	IND	I-WH	Industrial Warehouse
319	Identifier	IND	I-LT	Industrial Light
320	Warehousing	IND	I-WH	Industrial Warehouse
321	Yard (open storage)	IND	I-WH	Industrial Warehouse
322	Mini storage	IND	I-WH	Industrial Warehouse
323	Truck and freight terminals	IND	I-WH	Industrial Warehouse
324	Truck and freight terminals	IND	I-WH	Industrial Warehouse
327	Truck and freight terminals	IND	I-WH	Industrial Warehouse
329	Identifier	IND	I-WH	Industrial Warehouse
330	Mill	IND	I-LT	Industrial Light
331	Retail Yard	IND	I-LT	Industrial Light
332	Specialty products (chips, sawdust, etc.)	IND	I-LT	Industrial Light
339	Identifier	IND	I-LT	Industrial Light
340	Definition Not Available	MISC	MISC	Miscellaneous
341	Definition Not Available	MISC	MISC	Miscellaneous
350	Fruit and Vegetables	IND	I-LT	Industrial Light
351	Meat products	IND	I-LT	Industrial Light
352	Wineries	IND	I-LT	Industrial Light
353	Sugar refinery	IND	I-LT	Industrial Light
354	Other food processing	IND	I-LT	Industrial Light
359	Identifier	IND	I-LT	Industrial Light
360	Feed and grain mills	IND	I-LT	Industrial Light
361	Retail feed and grain sales	IND	I-LT	Industrial Light
369	Identifier	IND	I-LT	Industrial Light
370	Factory	IND	I-HV	Industrial Heavy Manufacture
379	Identifier	IND	I-HV	Industrial Heavy Manufacture
390	Industrial common area	IND	MISC-IND	Miscellaneous Industrial
391	Multiple miscellaneous industrial uses	IND	MISC-IND	Miscellaneous Industrial
392	Industrial use – no other category	IND	MISC-IND	Miscellaneous Industrial
393	Industrial combo	IND	MISC-IND	Miscellaneous Industrial
399	Identifier	IND	MISC-IND	Miscellaneous Industrial
400	Row crop	CROP	CROP	Crops

Table A-17. Yolo County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
401	Rice land	CROP	CROP	Crops
402	Field crop	CROP	CROP	Crops
403	Pasture	CROP	CROP	Crops
404	Duck club	CROP	CROP	Crops
409	Identifier	CROP	CROP	Crops
410	Prunes	CROP	CROP	Crops
411	Apricots	CROP	CROP	Crops
412	Pears	CROP	CROP	Crops
414	Mixed	CROP	CROP	Crops
415	Miscellaneous	CROP	CROP	Crops
416	Miscellaneous	CROP	CROP	Crops
419	Identifier	CROP	CROP	Crops
420	Almonds	CROP	CROP	Crops
421	Walnuts	CROP	CROP	Crops
422	Pistachios	CROP	CROP	Crops
423	Mixed	CROP	CROP	Crops
424	Miscellaneous	CROP	CROP	Crops
429	Identifier	CROP	CROP	Crops
430	Chenin Blanc	CROP	CROP	Crops
431	Cabernet Sauvignon	CROP	CROP	Crops
433	Sauvignon Blanc	CROP	CROP	Crops
434	Chardonnay	CROP	CROP	Crops
435	Zinfandel	CROP	CROP	Crops
436	Symphony	CROP	CROP	Crops
438	Mixed	CROP	CROP	Crops
439	Identifier	CROP	CROP	Crops
440	Row crop I and II	CROP	CROP	Crops
441	Row crop III and IV	CROP	CROP	Crops
442	Row crop - Clarksburg	CROP	CROP	Crops
443	Row crop – Capay	CROP	CROP	Crops
444	Rice land	CROP	CROP	Crops
445	Rolling land	CROP	CROP	Crops
446	Pasture	CROP	CROP	Crops
447	Class III and IV – Capay	CROP	CROP	Crops
449	Identifier	CROP	CROP	Crops
470	Dairy	IND	I-LT	Industrial Light
471	Feed lot	COM	MISC-COM	Miscellaneous Commercial

Table A-17. Yolo County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
472	Poultry or bird	IND	I-LT	Industrial Light
474	Apiary	IND	I-LT	Industrial Light
475	Kennels	COM	MISC-COM	Miscellaneous Commercial
479	Identifier	CROP	CROP	Crops
483	Research farm	FARM	FARM	Farm Buildings Including Primary Residence
490	Rural residential - 1 residence	FARM	FARM	Farm Buildings Including Primary Residence
491	Rural residential - 2 or more	FARM	FARM	Farm Buildings Including Primary Residence
492	Rural H.S. with miscellaneous improvements only	FARM	FARM	Farm Buildings Including Primary Residence
493	Labor camp	FARM	FARM	Farm Buildings Including Primary Residence
494	Rural H.S. 0-5 acres – vacant	FARM	MISC-FARM	Miscellaneous Farm
495	Rural H.S. 5-20 acres – vacant	FARM	MISC-FARM	Miscellaneous Farm
496	Taxable mobile home	MH	MH	Mobile Home Single/Double
498	Rural residential – 1 residence	FARM	FARM	Farm Buildings Including Primary RES
499	Identifier	FARM	FARM	Farm Buildings Including Primary Residence
500	Field crops	CROP	CROP	Crops
501	Pasture	CROP	CROP	Crops
502	Waste land	Misc	MISC	Miscellaneous
503	Sloughs and levees	Misc	MISC	Miscellaneous
509	Identifier	CROP	CROP	Crops
510	Range – High – brushy	CROP	CROP	Crops
511	Range – Low – open	CROP	CROP	Crops
512	Summer fallow	CROP	CROP	Crops
513	Dry orchard	CROP	CROP	Crops
514	Miscellaneous dry farming	CROP	CROP	Crops
515	Hunting club	PUB	P-REC	Public Recreation/Assembly
516	Rural H.S. over 20 acres – vacant	FARM	MISC-FARM	Miscellaneous Farm
517	Waste land	CROP	MISC-AG	Miscellaneous Agriculture
519	Identifier	CROP	CROP	Crops
610	Swimming pool	PUB	P-REC	Public Recreation/Assembly
611	Recreational center	PUB	P-REC	Public Recreation/Assembly

Table A-17. Yolo County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
612	Marina or yacht club	PUB	P-REC	Public Recreation/Assembly
619	Identifier	PUB	P-REC	Public Recreation/Assembly
620	Privately owned halls	PUB	P-REC	Public Recreation/Assembly
630	Bowling center	PUB	P-REC	Public Recreation/Assembly
631	Arcades and amusement centers	PUB	P-REC	Public Recreation/Assembly
632	Skating ring	PUB	P-REC	Public Recreation/Assembly
640	Clubs and lodge halls	PUB	P-REC	Public Recreation/Assembly
649	Identifier	PUB	P-REC	Public Recreation/Assembly
650	Privately owned	PUB	P-REC	Public Recreation/Assembly
659	Identifier	PUB	P-REC	Public Recreation/Assembly
660	18 Hole	PUB	P-REC	Public Recreation/Assembly
661	9 Hole	PUB	P-REC	Public Recreation/Assembly
662	Country club	PUB	P-REC	Public Recreation/Assembly
669	Identifier	PUB	P-REC	Public Recreation/Assembly
670	Walk-in	PUB	P-REC	Public Recreation/Assembly
672	Stage-Live	PUB	P-REC	Public Recreation/Assembly
690	Privately owned parks	PUB	P-REC	Public Recreation/Assembly
710	Church, synagogue, or temple	PUB	P-CH	Public Church
711	Other property used with and essential to a church	PUB	P-CH	Public Church
712	Church and school combination	PUB	P-CH	Public Church
719	Identifier	PUB	P-CH	Public Church
720	Private schools	PUB	P-SCH	Public and Private Schools
721	Parochial school	PUB	P-SCH	Public and Private Schools
722	Special school	PUB	P-SCH	Public and Private Schools
723	Schools	PUB	P-SCH	Public and Private Schools
729	Identifier	PUB	P-SCH	Public and Private Schools
740	Full service	COM	C-HOS	Hospital
741	Convalescent	COM	C-HOS	Hospital
742	Clinic	COM	C-HOS	Hospital
749	Identifier	COM	C-HOS	Hospital
750	Rest home	COM	ELDER	Eldercare
751	Special home	COM	ELDER	Eldercare
759	Identifier	COM	ELDER	Eldercare
770	Cemetery	Misc	MISC	Miscellaneous
771	Mortuary or funeral home	Misc	MISC	Miscellaneous

Table A-17. Yolo County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
779	Identifier	Misc	MISC	Miscellaneous
790	Mineral extraction	IND	I-LT	Industrial Light
791	Sand and gravel plant	IND	I-LT	Industrial Light
799	Identifier	IND	I-LT	Industrial Light
800	Vacant R-1 undeveloped	Misc	MISC	Miscellaneous
801	Vacant R-1 with utilities	Misc	MISC	Miscellaneous
803	Vacant apartment undeveloped	SFR	MISC-RES	Miscellaneous Residential
804	Vacant apartment with utilities	SFR	MISC-RES	Miscellaneous Residential
805	Vacant commercial undeveloped	COM	MISC-COM	Miscellaneous Commercial
806	Vacant commercial with utilities	COM	MISC-COM	Miscellaneous Commercial
807	Vacant industrial undeveloped	IND	MISC-IND	Miscellaneous Industrial
808	Vacant industrial with utilities	IND	MISC-IND	Miscellaneous Industrial
809	Identifier	Misc	MISC	Miscellaneous
820	Lake, creek, river or stream	Misc	MISC	Miscellaneous
829	Identifier	Misc	MISC	Miscellaneous
830	Right of way	Misc	MISC	Miscellaneous
831	Private road or street	Misc	MISC	Miscellaneous
839	Identifier	PUB	MISC-PUB	Miscellaneous Public/Government
900	Vacant federal land	Misc	MISC	Miscellaneous
901	Federal buildings	PUB	P-GOV	Public Government Building
909	Identifier	PUB	MISC-PUB	Miscellaneous Public/Government
910	Vacant state land	Misc	MISC	Miscellaneous
920	Vacant county land	Misc	MISC	Miscellaneous
921	County buildings	PUB	P-GOV	Public Government Building
925	Miscellaneous county property	PUB	P-GOV	Public Government Building
929	Identifier	PUB	P-GOV	Public Government Building
930	Vacant city land	Misc	MISC	Miscellaneous
933	Parks and other recreational facilities	PUB	P-REC	Public Recreation/Assembly
937	Miscellaneous city property	PUB	MISC-PUB	Miscellaneous Public/Government
939	Identifier	PUB	P-GOV	Public Government Building
940	School district property	PUB	P-GOV	Public Government Building
941	Fire district property	PUB	P-GOV	Public Government Building
942	Flood control district property	PUB	P-GOV	Public Government Building
943	Water district property	PUB	P-GOV	Public Government Building

Table A-17. Yolo County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
944	Miscellaneous district property	PUB	P-GOV	Public Government Building
949	Identifier	PUB	P-GOV	Public Government Building
959	Identifier	PUB	P-GOV	Public Government Building
960	Well site	Misc	MISC	Miscellaneous
962	Spring or other water sources	Misc	MISC	Miscellaneous
963	Slough	Misc	MISC	Miscellaneous
969	Identifier	Misc	MISC	Miscellaneous
970	SBE valued property	COM	MISC-COM	Miscellaneous Commercial
971	Utility water company	COM	MISC-COM	Miscellaneous Commercial
973	Cable TV	COM	C-RET	Commercial Retail
974	Radio and TV broadcast site	PUB	P-REC	Public Recreation/Assembly
975	Pipeline right of way	Misc	MISC	Miscellaneous
979	Identifier	PUB	MISC-PUB	Miscellaneous Public/Government
999	Definition Not Available	Misc	MISC	Miscellaneous
829	Identifier	Misc	MISC	Miscellaneous
830	Right of way	Misc	MISC	Miscellaneous
831	Private road or street	Misc	MISC	Miscellaneous
839	Identifier	PUB	MISC-PUB	Miscellaneous Public/Government
900	Vacant federal land	Misc	MISC	Miscellaneous
901	Federal buildings	PUB	P-GOV	Public Government Building
909	Identifier	PUB	MISC-PUB	Miscellaneous Public/Government
910	Vacant state land	Misc	MISC	Miscellaneous
920	Vacant county land	Misc	MISC	Miscellaneous
921	County buildings	PUB	P-GOV	Public Government Building
925	Miscellaneous county property	PUB	P-GOV	Public Government Building
929	Identifier	PUB	P-GOV	Public Government Building
930	Vacant city land	Misc	MISC	Miscellaneous
933	Parks and other recreational facilities	PUB	P-REC	Public Recreation/Assembly
937	Miscellaneous city property	PUB	MISC-PUB	Miscellaneous Public/Government
939	Identifier	PUB	P-GOV	Public Government Building
940	School district property	PUB	P-GOV	Public Government Building
941	Fire district property	PUB	P-GOV	Public Government Building
942	Flood control district property	PUB	P-GOV	Public Government Building
943	Water district property	PUB	P-GOV	Public Government Building

Table A-17. Yolo County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
944	Miscellaneous district property	PUB	P-GOV	Public Government Building
949	Identifier	PUB	P-GOV	Public Government Building
959	Identifier	PUB	P-GOV	Public Government Building
960	Well site	Misc	MISC	Miscellaneous
962	Spring or other water sources	Misc	MISC	Miscellaneous
963	Slough	Misc	MISC	Miscellaneous
969	Identifier	Misc	MISC	Miscellaneous
970	SBE valued property	COM	MISC-COM	Miscellaneous Commercial
971	Utility water company	COM	MISC-COM	Miscellaneous Commercial
973	Cable TV	COM	C-RET	Commercial Retail
974	Radio and TV broadcast site	PUB	P-REC	Public Recreation/Assembly
975	Pipeline right of way	Misc	MISC	Miscellaneous
979	Identifier	PUB	MISC-PUB	Miscellaneous Public/Government
999	Definition Not Available	Misc	MISC	Miscellaneous

Table A-18. Yuba County Land Use Codes

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
101	Vacant land single-family	MISC	MISC	Miscellaneous
102	Vacant land – common area	MISC	MISC	Miscellaneous
105	Vacant land multi-family	MISC	MISC	Miscellaneous
110	Single-family urban	SFR	SFR	Single-family Residential
115	Single-family residential – rural	SFR	SFR	Single-family Residential
120	2 or more dwellings not subdividable	MFR	MFR	Multi-Family Residential
125	Licensed mobile home on private property	MH	MH	Mobile Home Single/Double
126	Taxable mobile home on private property	MH	MH	Mobile Home Single/Double
127	Taxable mobile home in mobile home park	MH	MH	Mobile Home Single/Double
129	Mobile home on permanent foundation	MH	MH	Mobile Home Single/Double
130	Condo, townhouse, or planned development	MFR	MFR	Multi-Family Residential
135	Vacation cabin	SFR	SFR	Single-family Residential
140	Duplex or triplex	MFR	MFR	Multi-Family Residential
145	Four or more apartments	MFR	MFR	Multi-Family Residential
155	Mobile home park	MH	MH	Mobile Home Single/Double
160	Hotel	COM	C-HOTEL	Hotel
165	Motel	COM	C-HOTEL	Hotel
170	Group quarters retirement, etc	COM	ELDER	Eldercare
199	Miscellaneous improvements	SFR	MISC-RES	Miscellaneous Residential
201	Vacant land industrial	Misc	MISC	Miscellaneous
205	Warehouse – primarily storage	IND	I-WH	Industrial Warehouse
210	Light manufacturing	IND	I-LT	Industrial Light
215	Heavy manufacturing	IND	I-HV	Industrial Heavy Manufacture
220	Bulk plant	IND	I-HV	Industrial Heavy Manufacture
225	Food processing	IND	I-LT	Industrial Light
230	Lumber processing	IND	I-HV	Industrial Heavy Manufacture
235	Mineral processing	IND	I-HV	Industrial Heavy Manufacture
240	Wholesale distributor	IND	I-LT	Industrial Light
245	Mini-warehouse	IND	I-WH	Industrial Warehouse
299	Other industrial improvements	IND	MISC-IND	Miscellaneous Industrial
301	Vacant land – more than 50 acres	MISC	MISC	Miscellaneous
302	Vacant rural homesite – 5 acres or less	MISC	MISC	Miscellaneous

Table A-18. Yuba County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
304	Vacant rural homesite – 5 to 10 acres	MISC	MISC	Miscellaneous
306	Vacant rural homesite – 10 to 20 acres	MISC	MISC	Miscellaneous
308	Ranchette – 20 to 50 acres	FARM	FARM	Farm Buildings Including Primary Residence
310	Peaches	CROP	CROP	Crops
311	Prunes	CROP	CROP	Crops
312	Pears	CROP	CROP	Crops
313	Walnuts	CROP	CROP	Crops
314	Almonds	CROP	CROP	Crops
315	Olives	CROP	CROP	Crops
316	Grape vineyards	CROP	CROP	Crops
317	Kiwis	CROP	CROP	Crops
325	Orchards mixed	CROP	CROP	Crops
330	Rice	CROP	CROP	Crops
333	Rice and hunting	CROP	CROP	Crops
335	Row crops	CROP	CROP	Crops
340	Irrigated pasture	CROP	CROP	Crops
345	Native pasture	CROP	CROP	Crops
350	Native pasture and hunting	CROP	CROP	Crops
355	Irrigated field crops	CROP	CROP	Crops
356	Non-irrigated field crops	CROP	CROP	Crops
360	Dairy	IND	I-LT	Industrial Light
362	Livestock operations	IND	I-LT	Industrial Light
370	Mineral rights or mining	IND	I-HV	Industrial Heavy Manufacture
373	Hunting and fishing rights	MISC	MISC	Miscellaneous
375	Timber	CROP	MISC-AG	Miscellaneous Agriculture
376	Timber preserve zone	CROP	MISC-AG	Miscellaneous Agriculture
380	Department of Fish and Game – wildlife management area	PUB	P-GOV	Public Government Building
382	Definition Not Available	CROP	MISC-AG	Miscellaneous Agriculture
399	Miscellaneous agricultural or rural properties	CROP	MISC-AG	Miscellaneous Agriculture
405	Undedicated private streets, roads or walkways	MISC	MISC	Miscellaneous
410	Transportation – terminals, yards	PUB	P-GOV	Public Government Building
415	Airports	PUB	AIR	Airport
420	Parking lots and garages	COM	MISC-COM	Miscellaneous Commercial

Table A-18. Yuba County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
425	Communications	COM	MISC-COM	Miscellaneous Commercial
430	Private water – sanitation system	PUB	P-GOV	Public Government Building
435	Water well site (private)	MISC	MISC	Miscellaneous
499	Other transportation, communication, or utility	PUB	P-GOV	Public Government Building
501	Vacant land – commercial	MISC	MISC	Miscellaneous
510	Downtown store	COM	C-SHOP	Commercial Shopping Center
515	Shopping center	COM	C-SHOP	Commercial Shopping Center
520	Spot retail	COM	C-RET	Commercial Retail
525	Strip retail	COM	C-RET	Commercial Retail
530	Service station	COM	C-SERV	Commercial Service-Auto
533	Car wash	COM	C-SERV	Commercial Service-Auto
535	Amusement and recreation	PUB	P-REC	Public Recreation/Assembly
540	Restaurants, coffee shops, etc.	COM	C-FOOD	Commercial Food-Retail
550	Golf course	PUB	P-REC	Public Recreation/Assembly
599	Other commercial	COM	MISC-COM	Miscellaneous Commercial
610	Medical or dental office	COM	C-MED	Commercial Medical
615	General office	COM	C-OFF	Commercial Office
620	Financial institutions	PUB	P-GOV	Public Government Building
630	Hospitals, rest homes, convalescent hospitals	COM	C-HOS	Hospital
635	Mortuary	COM	C-MED	Commercial Medical
640	Cemetery	MISC	MISC	Miscellaneous
690	Religious, charitable, fraternal organizations and services	PUB	P-REC	Public Recreation/Assembly
691	Religious camps	PUB	P-REC	Public Recreation/Assembly
692	Definition Not Available	COM	MISC-COM	Miscellaneous Commercial
699	Other services	COM	MISC-COM	Miscellaneous Commercial
901	Olivehurst public utility district	PUB	P-GOV	Public Government Building
902	Linda county water district	PUB	P-GOV	Public Government Building
903	City of Wheatland	PUB	P-GOV	Public Government Building
904	Yuba county water district	PUB	P-GOV	Public Government Building
905	City of Marysville	PUB	P-GOV	Public Government Building
906	County property	PUB	P-GOV	Public Government Building
907	State property	PUB	P-GOV	Public Government Building
908	Yuba county water agency	PUB	P-GOV	Public Government Building
909	Browns valley irrigation district	PUB	P-GOV	Public Government Building
910	Pacific Gas and Electric	PUB	P-GOV	Public Government Building

Table A-18. Yuba County Land Use Codes (cont.)

County Use	Description	FDA_Damage	OCC-Name	Corps OCC-Description
911	Telephone company	PUB	P-GOV	Public Government Building
915	Air Force base	PUB	AIR	Airport
916	National forest	PUB	P-REC	Public Recreation/Assembly
917	Government wildlife preserve	PUB	P-REC	Public Recreation/Assembly
918	Federal property – other	PUB	P-GOV	Public Government Building
920	Postal property	PUB	P-GOV	Public Government Building
925	Highway parcel	PUB	MISC-PUB	Miscellaneous Public/Government
930	Parks including playfields	PUB	P-REC	Public Recreation/Assembly
935	Railways	PUB	P-GOV	Public Government Building
940	Redevelopment agency	PUB	P-GOV	Public Government Building
945	Sanitary and drainage districts	PUB	P-GOV	Public Government Building
946	Fire protection districts	PUB	FIRE	Fire station
950	Elementary school	PUB	P-SCH	Public and Private Schools
951	Junior high school	PUB	P-SCH	Public and Private Schools
952	High school	PUB	P-SCH	Public and Private Schools
953	Community and junior college	PUB	P-SCH	Public and Private Schools
954	State colleges and universities	PUB	P-SCH	Public and Private Schools
955	Definition Not Available	PUB	MISC-PUB	Miscellaneous Public/Government
956	Definition Not Available	PUB	MISC-PUB	Miscellaneous Public/Government
990	Definition Not Available	PUB	MISC-PUB	Miscellaneous Public/Government
995	Other public water and irrigation districts	PUB	P-GOV	Public Government Building
996	Reclamation district	PUB	P-GOV	Public Government Building
999	Other non-taxable property	PUB	MISC-PUB	Miscellaneous Public/Government

Key:
Corps = U.S. Army Corps of Engineers
FDA = Flood Damage Analysis
OCC = occupancy

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CENTRAL VALLEY
FLOOD MANAGEMENT
PLANNING PROGRAM

FloodSAFE
CALIFORNIA

2012 Central Valley Flood Protection Plan

Attachment 8F: Flood Damage Analysis Appendix B – Marshall & Swift Valuation Tables

June 2012

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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Table B-1. Cost Per Square Foot by Construction Class and Quality for Airports

Class	Excellent	Good	Average	Low Cost	Cheap
A	$374.95	$264.04	$185.85	$130.97	N/A
B	$374.95	$264.04	$185.85	$130.97	N/A
C	$262.14	$156.21	$96.06	$60.87	N/A
D	N/A	$145.25	$88.87	$56.15	N/A
S	N/A	N/A	$88.48	$55.64	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Passenger Terminals (571), Section 14 Page 20
3. Expiration Date: January 2012
Key:
N/A = Not available

Table B-2. Cost Per Square Foot by Construction Class and Quality for Commercial Auto Sales

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	$126.42	N/A	N/A
B	N/A	N/A	$126.42	N/A	N/A
C	$163.70	$115.81	$83.84	$57.58	N/A
D	$156.92	$109.71	$78.69	$53.50	N/A
S	N/A	$110.28	$78.13	$52.50	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Showrooms (303), Section 14 Page 31
3. Expiration Date: January 2012
Key:
N/A = Not available

Table B-3. Cost Per Square Foot by Construction Class and Quality for Commercial Fast Food Restaurants

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	$197.51	$149.52	N/A	N/A
B	N/A	$1971.51	$149.52	N/A	N/A
C	$247.06	$146.35	$113.14	$81.62	N/A
D	$235.44	$135.90	$103.75	$73.38	N/A
S	$192.74	$140.08	$104.62	$72.35	N/A

Notes:
1. Marshall & Swift, 2nd Quarter
2. Restaurants – Fast Food (349), Section 13 Page 17
3. Expiration Date: April 2012
Key:
N/A = Not available

Table B-4. Cost Per Square Foot by Construction Class and Quality for Commercial Food-Retail

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	$92.51	N/A	N/A
B	N/A	N/A	$92.51	N/A	N/A
C	$110.46	$92.51	$74.43	$60.06	N/A
D	$103.59	$86.52	$69.22	$55.54	N/A
S	$107.26	$88.53	$70.05	$55.56	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Convenience Stores (419) Section 13, Page 22
3. Expiration Date: April 2010
Key:
N/A = Not available

Table B-5. Cost Per Square Foot by Construction Class and Quality for Commercial Grocery Store

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	$102.57	$89.05	N/A	N/A
B	N/A	$102.57	$89.05	N/A	N/A
C	$105.01	$88.28	$71.94	$60.56	N/A
D	$97.68	$81.96	$66.49	N/A	N/A
S	N/A	$83.63	$66.75	$55.19	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Supermarkets (446), Section 13 Page 20
3. Expiration Date: April 2010
Key:
N/A = Not available

Table B-6. Cost Per Square Foot by Construction Class and Quality for Commercial Medical

Class	Excellent	Good	Average	Low Cost	Cheap
A	$247.25	$198.50	$152.55	$116.78	N/A
B	$239.51	$191.71	$146.64	$111.69	N/A
C	$202.23	$153.65	$116.34	$88.69	N/A
D	$183.16	$145.37	$110.05	$83.92	N/A
S	N/A	$144.80	$106.08	$81.05	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Medical Office Buildings (341), Section 15 Page 22
3. Expiration Date: October 2011
Key:
N/A = Not available

Table B-7. Cost Per Square Foot by Construction Class and Quality for Commercial Office

Class	Excellent	Good	Average	Low Cost	Cheap
A	$228.51	$180.87	$136.48	$108.73	N/A
B	$221.51	$174.24	$130.40	$103.30	N/A
C	$186.51	$130.22	$92.48	$62.31	N/A
D	$175.86	$122.39	$86.73	$58.08	N/A
S	N/A	$121.88	$83.87	$56.91	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Office Buildings (344), Section 15 Page 17
3. Expiration Date: October 2011

Key:
N/A = Not available

Table B-8. Cost Per Square Foot by Construction Class and Quality for Commercial Restaurants

Class	Excellent	Good	Average	Low Cost	Cheap
A	$239.26	$178.97	$134.67	N/A	N/A
B	$239.26	$178.97	$134.67	N/A	N/A
C	$225.01	$135.70	$105.78	$76.61	N/A
D	$214.61	$126.19	$97.21	$69.04	N/A
S	N/A	$129.37	$97.03	$66.98	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Restaurants (350), Section 13 Page 14
3. Expiration Date: April 2010

Key:
N/A = Not available

Table B-9. Cost Per Square Foot by Construction Class and Quality for Commercial Retail

Class	Excellent	Good	Average	Low Cost	Cheap
A	$154.30	$115.84	$91.10	$69.27	N/A
B	$148.81	$111.07	$87.00	$65.79	N/A
C	$123.67	$91.29	$69.36	$49.93	N/A
D	$116.59	$85.56	$64.76	$46.25	N/A
S	N/A	$87.50	$64.94	$45.49	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April2010
2. Retail Stores (353), Section 13 Page 26
3. Expiration Date: April 2010

Key:
N/A = Not available

Table B-10. Cost Per Square Foot by Construction Class and Quality for Commercial Service-Auto

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	$70.38	N/A	N/A
B	N/A	N/A	$70.38	N/A	N/A
C	$92.93	$65.37	$47.31	$34.42	N/A
D	N/A	$56.85	$41.65	$30.68	N/A
S	N/A	$55.47	$40.10	$29.15	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Service (Repair) Garages (528), Section 14 Page 32
3. Expiration Date: January 2012
Key:
N/A = Not available

Table B-11. Cost Per Square Foot by Construction Class and Quality for Commercial Shopping Center

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	N/A	N/A	N/A
B	N/A	N/A	N/A	N/A	N/A
C	$56.95	$43.27	32.91	N/A	N/A
D	N/A	$38.05	$38.91	N/A	N/A
S	N/A	$51.68	$40.02	$31.09	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Warehouse Discount Stores (458) Section 13, Page 28
3. Expiration Date: April 2010
Key:
N/A = Not available

Table B-12. Cost Per Square Foot by Construction Class and Quality for Daycare Facilities

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	$144.98	N/A	N/A
B	N/A	N/A	$144.98	N/A	N/A
C	$184.90	$141.61	$108.87	$80.33	N/A
D	$176.28	$133.57	$101.90	$74.35	N/A
S	N/A	N/A	$104.86	$76.58	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Day Care Centers (426), Section 18 Page 13
3. Expiration Date: January 2011
Key:
N/A = Not available

Table B-13. Cost Per Square Foot by Construction Class and Quality for Eldercare Facilities

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	N/A	N/A	N/A
B	N/A	N/A	N/A	N/A	N/A
C	$122.43	$99.71	$81.78	N/A	N/A
D	$114.98	$93.58	$76.73	$61.02	N/A
S	N/A	$93.65	$76.85	N/A	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Multiple Residences- Elderly Assisted Living (589), Section 12 Page 20
3. Expiration Date: July 2010
Key:
N/A = Not available

Table B-14. Cost Per Square Foot by Construction Class and Quality for Fire stations

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	$225.46	$162.32	N/A	N/A
B	$225.46	$162.32	N/A	N/A	N/A
C	$215.64	$148.66	$103.83	$70.28	N/A
D	$205.43	$138.68	$94.93	$62.73	N/A
S	N/A	$124.99	$86.47	$57.56	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Fire Stations – Staffed (322), Section 15 Page 29
3. Expiration Date: October 2011
Key:
N/A = Not available

Table B-15. Cost Per Square Foot by Construction Class and Quality for Full Service Auto Dealership

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	$111.81	N/A	N/A
B	N/A	N/A	$111.81	N/A	N/A
C	$147.62	$103.44	$74.41	$50.62	N/A
D	$141.00	$97.52	$69.45	$46.54	N/A
S	N/A	$98.16	$69.44	$46.27	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Complete Auto Dealerships (455), Section 14 Page 30
3. Expiration Date: January 2012
Key:
N/A = Not available

Table B-16. Cost Per Square Foot by Construction Class and Quality for Furniture Store

Class	Excellent	Good	Average	Low Cost	Cheap
A	$179.72	$145.17	$112.13	N/A	N/A
B	$172.85	$139.47	$107.39	N/A	N/A
C	$150.65	$114.50	$91.20	N/A	N/A
D	N/A	N/A	N/A	N/A	N/A
S	N/A	N/A	N/A	N/A	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Department Stores (318), Section 13 Page 27
3. Expiration Date: April 2010

Key:
N/A = Not available

Table B-17. Cost Per Square Foot by Construction Class and Quality for Government Administrative

Class	Excellent	Good	Average	Low Cost	Cheap
A	$278.35	$212.99	$156.66	N/A	N/A
B	$266.47	$205.09	$151.48	$114.33	N/A
C	$223.87	$160.75	$121.27	$86.31	N/A
D	$214.34	$153.24	$109.01	$79.04	N/A
S	N/A	N/A	$110.88	$80.67	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Governmental Buildings (327), Section 15 Page 30
3. Expiration Date: October 2011

Key:
N/A = Not available

Table B-18. Cost Per Square Foot by Construction Class and Quality for Hospitals

Class	Excellent	Good	Average	Low Cost	Cheap
A	$414.04	$316.78	$242.99	$186.82	N/A
B	$403.17	$309.10	$237.59	$183.05	N/A
C	$316.88	$237.29	$178.22	$132.84	N/A
D	N/A	$223.34	$168.46	$127.30	N/A
S	N/A	N/A	N/A	$129.28	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. General Hospitals (331), Section 15 Page 24
3. Expiration Date: October 2011

Key:
N/A = Not available

Table B-19. Cost Per Square Foot by Construction Class and Quality for Hotels

Class	Excellent	Good	Average	Low Cost	Cheap
A	$156.01	$131.13	$113.39	$94.96	N/A
B	$149.34	$125.03	$107.82	$89.86	N/A
C	$133.93	$109.98	$87.16	$72.82	N/A
D	N/A	$101.60	$80.05	$66.78	N/A
S	N/A	N/A	$84.73	N/A	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Hotels: Limited Service (595), Section 11 Page 22
3. Expiration Date: October 2010

Key:
N/A = Not available

Table B-20. Cost Per Square Foot by Construction Class and Quality for Industrial Heavy Manufacture

Class	Excellent	Good	Average	Low Cost	Cheap
A	$211.22	$169.87	$130.07	$100.99	N/A
B	$201.86	$162.28	$123.92	$96.02	N/A
C	N/A	$129.43	$96.72	$69.68	N/A
D	N/A	N/A	$85.26	$65.59	N/A
S	N/A	$123.15	$87.33	$66.72	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Industrials, Heavy (Process) Manufacturing (495), Section 14 Page 15
3. Expiration Date: January 2012

Key:
N/A = Not available

Table B-21. Cost Per Square Foot by Construction Class and Quality for Industrial Light

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	$68.41	$47.42	N/A
B	N/A	N/A	$63.93	$44.00	N/A
C	N/A	$59.72	$43.03	$31.18	N/A
D	N/A	$54.51	$38.78	$27.77	N/A
S	N/A	$54.76	$38.64	$27.46	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Industrials, Light Manufacturing (494), Section 14 Page 14
3. Expiration Date: January 2012

Key:
N/A = Not available

Table B-22. Cost Per Square Foot by Construction Class and Quality for Industrial Warehouse

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	$77.13	$56.66	$44.59	N/A
B	N/A	$72.23	$52.56	$41.16	N/A
C	$79.89	$51.67	$36.29	$25.67	N/A
D	N/A	$46.16	$32.33	$22.83	N/A
S	$73.68	$46.77	$32.47	$22.74	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Storage Warehouses (406), Section 14 Page 26
3. Expiration Date: January 2012
Key:
N/A = Not available

Table B-23. Cost Per Square Foot by Construction Class and Quality for Jails

Class	Excellent	Good	Average	Low Cost	Cheap
A	$355.39	$261.64	$194.71	N/A	N/A
B	$355.39	$261.64	$194.71	N/A	N/A
C	$293.77	$215.86	$160.73	$120.48	N/A
D	$273.51	$203.45	$150.71	N/A	N/A
S	N/A	N/A	$153.87	N/A	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Jails – Correctional Facilities (335), Section 15 Page 33
3. Expiration Date: October 2011
Key:
N/A = Not available

Table B-24. Cost Per Square Foot by Construction Class and Quality for Judicial

Class	Excellent	Good	Average	Low Cost	Cheap
A	$278.35	$212.99	$156.66	N/A	N/A
B	$266.47	$205.09	$151.48	$114.33	N/A
C	$223.87	$160.75	$121.27	$86.31	N/A
D	$214.34	$153.24	$109.01	$79.04	N/A
S	N/A	N/A	$110.88	$80.67	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Governmental Buildings (327), Section 15 Page 30
3. Expiration Date: October 2011
Key:
N/A = Not available

Table B-25. Cost per square foot by Construction Class and Quality for Mobile Home Single/Double

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	N/A	N/A	N/A
B	N/A	N/A	N/A	N/A	N/A
C	N/A	N/A	N/A	N/A	N/A
D	$62.56	$45.85	$36.64	$27.96	N/A
S	N/A	N/A	N/A	N/A	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Manufactured Housing, Section 63 Pages 7-9
3. Expiration Date: August 2010
Key:
N/A = Not available

Table B-26. Cost Per Square Foot by Construction Class and Quality for Multi-Family Residential

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	N/A	N/A	N/A
B	N/A	N/A	N/A	N/A	N/A
C	$118.88	$88.29	$56.29	$48.24	N/A
D	$114.49	$84.40	$61.90	$45.34	N/A
S	N/A	$83.57	$61.44	N/A	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Multiple Residences (352), Section 12 Page 16
3. Expiration Date: July 2010
Key:
N/A = Not available

Table B-27. Cost Per Square Foot by Construction Class and Quality for Police Station

Class	Excellent	Good	Average	Low Cost	Cheap
A	$235.25	$177.19	$139.39	$107.45	N/A
B	$235.25	$177.19	$139.39	$107.45	N/A
C	$203.07	$152.57	$114.51	$85.76	N/A
D	$192.93	$144.83	$108.59	N/A	N/A
S	N/A	N/A	N/A	N/A	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Jails – Police Stations (489), Section 15 Page 33
3. Expiration Date: October 2011
Key:
N/A = Not available

Table B-28. Cost per square foot by Construction Class and Quality for Ports

Class	Excellent	Good	Average	Low Cost	Cheap
A	$211.22	$123.50	$85.05	$64.33	N/A
B	$201.86	$117.26	$80.14	$60.39	N/A
C	$79.89	$80.27	$58.68	$42.18	N/A
D	N/A	$50.34	$52.12	$38.73	N/A
S	$73.68	$74.89	$52.81	$38.97	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Average of Industrial Light, Industrial Heavy, and Industrial Warehouse
3. Expiration Date: January 2012
Key:
N/A = Not available

Table B-29. Cost Per Square Foot by Construction Class and Quality for Public and Private Schools

Class	Excellent	Good	Average	Low Cost	Cheap
A	$252.82	$207.28	$161.99	N/A	N/A
B	$239.54	$197.53	$154.90	N/A	N/A
C	$193.33	$152.26	$123.02	$98.55	N/A
D	$185.02	$144.46	$115.86	$92.06	N/A
S	N/A	$150.24	$119.84	$94.73	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Middle (Junior High) Schools (366) Section 18 Page 10
3. Expiration Date: January 2011
Key:
N/A = Not available

Table B-30. Cost Per Square Foot by Construction Class and Quality for Public Church

Class	Excellent	Good	Average	Low Cost	Cheap
A	$309.02	$227.88	$163.71	N/A	N/A
B	$294.11	$217.25	$156.14	N/A	N/A
C	$221.70	$163.32	$116.44	$82.44	N/A
D	$205.55	$151.51	$107.79	$76.09	N/A
S	N/A	$150.21	$108.54	$78.00	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Religious Buildings: Churches – Sanctuaries (Chapels) (309) Section 16 Page 9
3. Expiration Date: July 2011
Key:
N/A = Not available

Table B-31. Cost Per Square Foot by Construction Class and Quality for Public Government Building

Class	Excellent	Good	Average	Low Cost	Cheap
A	$278.35	$212.99	$156.66	N/A	N/A
B	$266.47	$205.09	$151.48	$114.33	N/A
C	$223.87	$160.75	$121.27	$86.31	N/A
D	$214.34	$153.24	$109.01	$79.04	N/A
S	N/A	N/A	$110.88	$80.67	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Governmental Buildings (327), Section 15 Page 30
3. Expiration Date: October 2011
Key:
N/A = Not available

Table B-32. Cost Per Square Foot by Construction Class and Quality for Public Recreation/Assembly

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	N/A	N/A	N/A
B	N/A	N/A	N/A	N/A	N/A
C	$164.09	$120.08	$85.97	$60.80	N/A
D	$154.62	$111.67	$78.75	$54.74	N/A
S	$147.84	$107.91	$76.85	$53.70	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Clubhouses (311), Section 11 Page 30
3. Expiration Date: October 2010
Key:
N/A = Not available

Table B-33. Cost Per Square Foot by Construction Class and Quality for Single Family Residential

Class	Excellent	Good	Average	Low Cost	Cheap
A	N/A	N/A	N/A	N/A	N/A
B	N/A	N/A	N/A	N/A	N/A
C	$164.09	$120.08	$85.97	$60.80	N/A
D	$154.62	$111.67	$78.75	$54.74	N/A
S	$147.84	$107.91	$76.85	$53.70	N/A

Notes:
1. Marshall & Swift, 2nd Quarter, April 2010
2. Single-Family Residential (351), Section 12 Page 25
3. Expiration Date: July 2010
Key:
N/A = Not available

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CENTRAL VALLEY
FLOOD MANAGEMENT
PLANNING PROGRAM

FloodSAFE
CALIFORNIA

2012 Central Valley Flood Protection Plan

Attachment 8F: Flood Damage Analysis Appendix C – Structure and Content Damage Functions

June 2012

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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Table C-1. CVFPP HEC-FDA Structure and Damage Functions

Occupancy Type	Description	Structure or Content?	Water Depth (in Feet)																										
			-8	-7	-6	-5	-4	-3	-2	-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C-RET1	Retail 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	42.7	79.8	94.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-RET2	Retail 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	20.5	38.3	49.6	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-DEAL1	Full Service Auto Dealership 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	5.8	5.8	5.8	41.1	80.3	97.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-DEAL2	Full Service Auto Dealership 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	2.8	2.8	2.8	19.7	38.5	50.9	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-FURN1	Furniture Store 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	89.5	98.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-FURN2	Furniture Store 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	42.9	47.1	52.3	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-HOS1	Hospital 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	50.0	75.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-HOS2	Hospital 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	24.0	36.2	52.3	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-AUTO1	Auto Sales 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	48.4	96.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-AUTO2	Auto Sales 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	42.9	46.4	52.3	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-HOTEL1	Hotel 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	47.4	91.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-HOTEL2	Hotel 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	22.7	43.8	52.3	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-FOOD1	Food-Retail 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.5	57.0	78.3	94.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-FOOD2	Food-Retail 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.2	27.3	37.6	49.4	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-RESTFF1	Fast Food Rest 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	45.1	87.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-RESTFF2	Fast Food Rest 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	21.6	42.1	52.3	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-GROC1	Grocery Store 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	61.0	87.3	94.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-GROC2	Grocery Store 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	29.3	41.9	49.4	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0

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Table C-1. CVFPP HEC-FDA Structure and Damage Functions (contd.)

			Water Depth (in Feet)																										
			-8	-7	-6	-5	-4	-3	-2	-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C-MED1	Medical 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	50.0	75.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-MED2	Medical 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	24.0	36.2	52.3	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-OFF1	Office 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	48.4	96.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-OFF2	Office 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	42.9	46.4	52.3	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-SHOP1	Shopping Center 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	76.5	95.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-SHOP2	Shopping Center 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	36.7	46.0	52.3	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-REST1	Restaurants 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	47.4	91.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-REST2	Restaurants 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	22.7	43.8	52.3	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
C-SERV1	Service-Auto 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	9.9	10	10.0	38.7	73.5	97.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
C-SERV2	Service-Auto 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	4.8	4.8	4.8	18.6	35.3	51.0	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
ELDER1*	Miscellaneous Commercial 1 Story	S																											
		C																											
ELDER2*	Miscellaneous Commercial 2-Story	S																											
		C																											
I-LT1	Light industrial 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.2	45.4	87.6	92.8	96.4	99.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
I-LT2	Light industrial 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.2	21.8	42.1	48.6	54.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
I-HV1	Heavy Manufacture 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	12.2	32.7	53.8	69.9	77.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
I-HV2	Heavy Manufacture 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	5.8	15.7	28.2	39.2	43.4	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
I-WH1	Warehouse 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	41.3	84.2	94.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
I-WH2	Warehouse 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	19.8	40.4	49.4	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
P-CH1	Church 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	47.3	73.4	83.9	98.8	98.8	98.8	98.8	98.8	98.8	98.8	98.8	98.8	98.8	100.0	100.0	100.0	100.0

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Table C-1. CVFPP HEC-FDA Structure and Damage Functions (contd.)

			Water Depth (in Feet)																									
			-8	-7	-6	-5	-4	-3	-2	-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10	11	12	13	14	15
P-CH2	Church 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	22.7	35.2	43.9	55.3	55.3	55.3	55.3	55.3	55.3	66.1	66.1	66.1	68.5	96.3	100.0	100.0	100.0
P-GOV1	Government Building 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	48.4	96.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
P-GOV2	Government Building 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	40.9	45.4	51.2	55.9	55.9	55.9	55.9	55.9	55.9	68.1	68.1	68.1	69.4	100.0	100.0	100.0	100.0
P-REC1	Recreation/Assembly 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	50.0	98.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
P-REC2	Recreation/Assembly 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	24.0	47.0	52.3	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
P-SCH1	Schools 1-story	S	0	0	0	0	0	0	0	0	3.5	7.0	14.4	21.7	26.0	30.2	31.2	32.4	32.4	39.8	42.8	51.7	53.1	54.1	61.8	64.8	64.8	65.5	86.1
		C	0	0	0	0	0	0	0	0	0	0.0	50.0	87.8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
P-SCH2	Schools 2-story	S	0	0	0	0	0	0	0	0	2.5	5.0	10.1	15.3	17.1	18.9	21.5	22.8	22.8	24.1	26.1	40.4	43.3	46.2	46.2	49.1	49.1	55.2	80.1
		C	0	0	0	0	0	0	0	0	0	0.0	24.0	42.1	52.3	56.0	56.0	56.0	56.0	56.0	56.0	66.9	66.9	66.9	69.3	96.3	100.0	100.0	100.0
SFRB1	Single Family Res. 1-story w/ basement	S	0	0	0	0	5.2	9.0	13.8	19.4	22.5	25.5	28.8	32.0	35.4	38.7	45.5	52.2	58.6	64.5	69.8	74.2	77.7	80.1	81.1	81.1	81.1	81.1	81.1
		C	0	0	0	0	5.7	8.0	10.5	13.2	14.6	16.0	17.5	18.9	20.4	21.8	24.7	27.4	30.0	32.4	34.5	36.3	37.7	38.6	39.1	39.1	39.1	39.1	39.1
SFRB2	Single Family Res. 2-story w/ basement	S	0	0	0	0	4.7	7.2	10.2	13.9	15.9	17.9	20.1	22.3	24.7	27.0	31.9	36.9	41.9	46.9	51.8	56.4	60.8	64.8	68.4	71.4	73.7	75.4	76.4
		C	0	0	0	0	5.2	6.8	8.4	10.1	11.0	11.9	12.9	13.8	14.8	15.7	17.7	19.8	22.0	24.3	26.7	29.1	31.7	34.4	37.2	40.0	43.0	46.1	49.3
SFRBS	Single Family Res. Splt-Lvl w/ Basement	S	0	0	0	0	4.7	7.2	10.4	14.2	16.4	18.5	20.9	23.2	25.7	28.2	33.4	38.6	43.8	48.8	53.5	57.8	61.6	64.8	67.2	68.8	69.3	69.3	69.3
		C	0	0	0	0	3.8	5.4	7.3	9.4	10.5	11.6	12.7	13.8	15.0	16.1	18.2	20.2	22.1	23.6	24.9	25.8	26.3	26.3	26.3	26.3	26.3	26.3	26.3
SFR1	Single Family Residential 1-story	S	0	0	0	0	0	0	0	2.5	8.0	13.4	18.4	23.3	27.7	32.1	40.1	47.1	53.2	58.6	63.2	67.2	70.5	73.2	75.4	77.2	78.5	79.5	80.2
		C	0	0	0	0	0	0	0	2.4	5.3	8.1	10.7	13.3	15.6	17.9	22.0	25.7	28.8	31.5	33.8	35.7	37.2	38.4	39.2	39.7	40.0	40.0	40.0
SFR2	Single Family Residential 2-story	S	0	0	0	0	0	0	0	3.0	6.2	9.3	12.3	15.2	18.1	20.9	26.3	31.4	36.2	40.7	44.9	48.8	52.4	55.7	58.7	61.4	63.8	65.9	67.7
		C	0	0	0	0	0	0	0	1.0	3.0	5.0	6.9	8.7	10.5	12.2	15.5	18.5	21.3	23.9	26.3	28.4	30.3	32.0	33.4	34.7	35.6	36.4	36.9
SFRS	Single Family Res. Split-Level	S	0	0	0	0	0	0	0	6.4	6.8	7.2	8.3	9.4	11.2	12.9	17.4	22.8	28.9	35.5	42.3	49.2	56.1	62.6	68.6	73.9	78.4	81.7	83.8
		C	0	0	0	0	0	0	0	2.2	2.6	2.9	3.8	4.7	6.1	7.5	11.1	15.3	20.1	25.2	30.5	35.7	40.9	45.8	50.2	54.1	57.2	59.4	60.5
MFR1	Multi-Family Residential 1-story	S	0	0	0	0	0	0	0	2.5	8.0	13.4	18.4	23.3	27.7	32.1	40.1	47.1	53.2	58.6	63.2	67.2	70.5	73.2	75.4	77.2	78.5	79.5	80.2
		C	0	0	0	0	0	0	0	2.4	5.3	8.1	10.7	13.3	15.6	17.9	22.0	25.7	28.8	31.5	33.8	35.7	37.2	38.4	39.2	39.7	40.0	40.0	40.0
MFR2	Multi-Family Residential 2-story	S	0	0	0	0	0	0	0	3.0	6.2	9.3	12.3	15.2	18.1	20.9	26.3	31.4	36.2	40.7	44.9	48.8	52.4	55.7	58.7	61.4	63.8	65.9	67.7
		C	0	0	0	0	0	0	0	1.0	3.0	5.0	6.9	8.7	10.5	12.2	15.5	18.5	21.3	23.9	26.3	28.4	30.3	32.0	33.4	34.7	35.6	36.4	36.9

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Table C-1. CVFPP HEC-FDA Structure and Damage Functions (contd.)

			Water Depth (in Feet)																									
			-8	-7	-6	-5	-4	-3	-2	-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MH	Mobile Home Single/Double	S	0	0	0	0	0	0	0	6.4	7.3	9.9	43.4	44.7	45.0	45.7	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5	96.5
		C	0	0	0	0	0	0	0	0	0	0.0	85.0	85.0	90.0	95.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
MISC-COM1*	Miscellaneous Commercial 1-Story	S																											
		C																											
MISC-COM2*	Miscellaneous Commercial 2-Story	S																											
		C																											
MISC-IND1*	Miscellaneous Industrial 1-Story	S																											
		C																											
MISC-IND2*	Miscellaneous Industrial 2-Story	S																											
		C																											
MISC-PUB1*	Miscellaneous Public 1-Story	S																											
		C																											
MISC-PUB2*	Miscellaneous Public 2-Story	S																											
		C																											
MISC-RES1*	Miscellaneous Residential 1-Story	S																											
		C																											
MISC-RES2*	Miscellaneous Residential 2-Story	S																											
		C																											

Note:
*Structure and content values for miscellaneous categories are calculated based on the distribution of occupancy types and therefore vary between each impact area.

Key:
C = Content
S = Structure

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CENTRAL VALLEY
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2012 Central Valley Flood Protection Plan

Attachment 8F: Flood Damage Analysis Appendix D – Crop Classifications

June 2012

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Table D-1. Citrus and Sub-Tropical Fruits

DWR Land Use Class	DWR Description	Crops in CVFPP Flood Damage Analysis
C	Not Classified	Oranges
C1	Grapefruit	Oranges
C10	Eucalyptus	Oranges
C11	Mixed Subtropical Fruits	Oranges
C2	Lemons	Oranges
C3	Oranges	Oranges
C4	Dates	Oranges
C5	Avocados	Oranges
C6	Olives	Oranges
C7	Misc. Subtropical	Oranges
C8	Kiwis	Oranges
C9	Jojoba	Oranges
C99	Not Classified	Oranges

Note:
The short term and long term cost per acre for oranges were calculated and applied to all Citrus & Sub-Tropical acreages.

Table D-2. Deciduous Fruits and Nuts

DWR Land Use Class	DWR Description	Crops in CVFPP Flood Damage Analysis
D	Not Classified	
D1	Apples	Prunes
D10	Misc. Deciduous	Almonds
D11	N/A	
D12	Almonds	Almonds
D13	Walnuts	Walnuts
D14	Pistachios	Walnuts
D2	Apricots	Prunes
D3	Cherries	Prunes
D4	N/A	
D5	Peaches and Nectarines	Peaches
D6	Pears	Pears
D7	Plums	Prunes
D8	Prunes	Prunes
D9	Figs	Prunes
D99	Not Classified	

Notes:
1. The short term and long term costs per acre for Almonds, Walnuts, Peaches and Nectarines, Pears, and Prunes were calculated.
2. A representative was chosen for each crop that did not fall into one of the categories listed above.
3. The short and long-term costs of the representative were applied to the appropriate crop.

Table D-3. Field Crops

DWR Land Use Class	DWR Description	Crops in CVFPP Flood Damage Analysis
F	Not Classified	
F1	Cotton	Cotton
F10	Beans	Beans
F11	Misc. Field	Corn
F12	Sunflowers	Corn
F13	Hybrid Sorghum/Sudan	Corn
F14	Millet	Safflower
F15	Sugar Cane	Corn
F2	Safflower	Safflower
F3	Flax	Millet
F4	Hops	Beans
F5	Sugar Beets	Beans
F6	Corn	Corn
F7	Sorghum	Corn
F8	Sudan	Corn
F9	Castor Beans	Beans
F99	Not Classified	

Notes:
1. The short term and long term costs per acre for Cotton, Beans, Safflower, and Corn were calculated.
2. A representative was chosen for each crop that did not fall into one of the categories listed above.
3. The short and long-term costs of the representative were applied to the appropriate crop.

Table D-4. Grains and Hay

DWR Land Use Class	DWR Description	Crops in CVFPP Flood Damage Analysis
G	Misc.	Wheat
G1	Barley	Wheat
G2	Wheat	Wheat
G3	Oats	Wheat
G6	Misc. Mixed	Wheat
G7	Mixed Grain and Hay	Wheat
G99	Not Classified	Wheat

Note:
1. The short term and long term costs per acre for Wheat were calculated and applied to all Grains and Hay acreage.

Table D-5. Idle

DWR Land Use Class	DWR Description	Crops in CVFPP Flood Damage Analysis
I	Idle	Idle
I1	Within Past 3 Years	Idle
I2	Being Prepared	Idle

Note:
The short term and long term costs per acre for Idle were calculated and applied to all Idle acreage.

Table D-6. Native Vegetation

DWR Land Use Class	DWR Description	Crops in CVFPP Flood Damage Analysis
NV	Not Classified	Native vegetation
NV1	Grassland	Native vegetation
NV2	Light Brush	Native vegetation
NV3	Medium Brush	Native vegetation
NV4	Heavy Brush	Native vegetation
NV5	Brush and Timber	Native vegetation
NV6	Forest	Native vegetation
NV7	Oak Grassland	Native vegetation

Note:
The short term and long term costs per acre for Native Vegetation were calculated and applied to all Native Vegetation acreage.

Table D-7. Pasture

DWR Land Use Class	DWR Description	Crops in CVFPP Flood Damage Analysis
P	Not Classified	Pasture
P1	Alfalfa	Pasture
P2	Clover	Pasture
P3	Mixed	Pasture
P4	Native	Pasture
P5	High Water Native	Pasture
P6	Misc. Grasses	Pasture
P7	Turf Farms	Pasture
P8	Bermuda Grass	Pasture
P9	Rye Grass	Pasture
P10	Klein Grass	Pasture
P99	Not Classified	Pasture

Notes:
1. The short term and long term cost per acre for Alfalfa and Pasture were calculated individually.
2. The short term and long term costs per acre for Alfalfa were applied to all Alfalfa acreage.
3. The short term and long term cost per acre for Pasture were applied to all other acreage in the Pasture category.

Table D-8. Rice

DWR Land Use Class	DWR Description	Crops in CVFPP Flood Damage Analysis
R	Not Classified	Rice
R1	Rice	Rice
R2	Wild Rice	Rice
R99	Not Classified	Rice

Note:
The short term and long term cost per acre for rice were calculated and applied to all rice acreage.

Table D-9. Semi-agricultural

DWR Land Use Class	DWR Description	Crops in CVFPP Flood Damage Analysis
S	Not Classified	Semi-agricultural
S1	Farmsteads (Includes a farm residence)	Semi-agricultural
S2	Livestock Feed Lots	Semi-agricultural
S3	Dairies	Semi-agricultural
S4	Poultry Farms	Semi-agricultural
S5	Farmsteads (without a farm residence)	Semi-agricultural
S99	Not Classified	Semi-agricultural

Note:
The short term and long term costs for semi- agricultural were calculated and applied to all semi-agricultural acreage.

Table D-10. Truck, Nursery, and Berry

DWR Land Use Class	DWR Description	Crops in CVFPP Flood Damage Analysis
T	Not Classified	Melons
T1	Artichokes	Melons
T10	Onions and Garlic	Melons
T11	Peas	Melons
T12	Potatoes	Melons
T13	Sweet Potatoes	Melons
T14	Spinach	Melons
T15	Tomatoes (Processing)	Melons
T16	Flowers, Nursery, Christmas Tree Farms	Melons
T17	Mixed	Melons
T18	Miscellaneous Truck	Melons
T19	Bush Berries	Melons
T2	Asparagus	Melons
T20	Strawberries	Melons
CLASS_SUB	**SUB_NAME**	**Representative Crops**
T21	Peppers (Chili, bell, etc.)	Melons
T22	Broccoli	Melons
T23	Cabbage	Melons
T24	Cauliflower	Melons
T25	Brussels Sprouts	Melons
T26	Tomatoes (Market)	x
T27	Greenhouse	Melons
T3	Beans (Green)	Melons
T4	Cole Crops (Mixture of 22-25)	Melons
T5	N/A	Melons
T6	Carrots	Melons
T7	Celery	Melons
T8	Lettuce (All types)	Melons
T9	Melons, Squash and Cucumbers	x
T99	Not Classified	Melons

Notes:
1. The short term and long term cost for Melons and Tomatoes were calculated individually.
2. Due to the variation in cost and differences in agricultural practices it was difficult to assign a representative crop. Because of this, Melons were chosen to provide a conservative estimate.

Table D-11. Vineyard

CLASS_SUB	SUB_NAME	Representative Crops
V	Not Classified	Wine Grapes
V1	Table Grapes	Wine Grapes
V2	Wine Grapes	x
V3	Raisin Grapes	Wine Grapes
V99	Not Classified	Wine Grapes

Note:
The short term and long term cost for Wine Grapes were calculated and applied to all vineyard acreage.

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